



MEMOIRS
OF
AGRICULTURE, &c.



**RESOLUTION of the Society for the
Encouragement of Arts, Manufactures,
and Commerce, June 17, 1767.**

*“ The Society for the Encouragement of
“ Arts, Manufactures, and Commerce, will
“ occasionally publish in this Work such Pieces
“ as they shall think proper to lay before the
“ Public.”*

N. B. The SECOND VOLUME of this work will be published in a few months ; and such Gentlemen as are disposed to favour the Editor with any communications respecting improvements in Agriculture, or other useful matters, are requested to send them to Mr. Nourse, Bookseller to His MAJESTY.

MEMOIRS
OF
AGRICULTURE,
AND OTHER
OECONOMICAL ARTS.

BY
ROBERT DOSSIE.

The Second Edition, Corrected.



L O N D O N:

Printed for J. Nourse, Bookfeller to His MAJESTY,

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TO THE
K I N G.

S I R,

AMONGST the many more important means, by which Your MAJESTY has promoted the interest of your subjects, and the welfare of mankind, you have been pleased to patronize, in a peculiar manner, the Polite Arts; and, also, the advancement of Natural History, and Mechanics; on which the improvement of Agriculture, and other Oeconomical Arts, principally depends. The fruits of Your MAJESTY's goodness, as to those points,

have been most eminently conspicuous, in the amazing progress, those arts have made in your dominions, since the commencement of your auspicious reign ; and in the spirit, which now prevails generally, of pushing them still further towards ultimate perfection.

The striking evidence, of your MAJESTY'S gracious disposition to countenance such pursuits, has given room to hope, that the proceedings of a Society, instituted for the Encouragement of Arts, Manufactures, and Commerce ; and whose assiduous labours, have produced adequate effects ; will not be thought wholly unworthy your royal notice : whence I have been emboldened, humbly to beg leave, to lay before Your Majesty the First Volume of the Memoirs of Agriculture, and other Oeconomical Arts : a work chiefly calculated to aid the efforts of the Society.

I flatter

I flatter myself with the more indulgence from Your MAJESTY, as it contains a brief history of the Society's transactions, from its first establishment to the end of the year 1767: exhibiting the nature of the several objects of its encouragement; the reasons for adopting them; the subsequent proceedings with the result; and the probable methods of completing the end, where not hitherto attained.

A long application to the study of the principles, and the knowledge of the facts, that afford lights into the respective subjects; together with a constant attendance on the Society, and a part in most of the transactions; inspired me with the audacity to engage in this difficult task: which, as it seemed, would have been otherwise unattempted: though essential to the rendering the Society's endeavours fully effectual, as to many particulars.

Great

Great, as have been my pains, and anxiety, to acquit myself well in this undertaking, if my performance should meet with the smallest share of Your MAJESTY's approbation, I shall think myself amply rewarded. At least I confide in Your MAJESTY's benign candour, that the utility of the design will excuse my want of greater abilities to execute it; and my presumption, in aspiring to present this volume to Your MAJESTY.

I am, SIR,

Your MAJESTY's

Most dutiful Subject, and

Most devoted, humble Servant,

ROBERT DOSSIE.

P R E F A C E.

TH E general great advantages to the public of improvements in agriculture, and other æconomical arts, are too evident to require any demonstration from argument. But there are reasons for our earnest attention to them, peculiar to the present times, which cannot be too strongly and universally inculcated.—The high price of all kinds of provisions, and the decline of our manufactures, are become affecting objects of the most serious consideration : as not only the welfare of numbers of individuals, but the flourishing condition of the state, and perhaps even our very existence as a free people, depend in some manner on them.—Under these alarming circumstances, we have, however, this consolation, that at the period when it is so necessary for us to use every possible means to check the progress of these evils, some events have taken place, which give us great room to hope for a future remedy, and security against them.—An extraordinary taste and fondness has happily arisen, not only in many gentlemen of independent fortunes, but even in opulent persons in professions, and trade, for applying to the advancement of husbandry, and other useful arts : and such a spirit subsists in numbers of them, and suffers neither assiduity nor expence to be wanting, to push experimental disquisition to the utmost extent. Among those, also, who do not actually engage in the practical part of these pursuits, we see many striving with equal ardour to promote this important end in a different way : that is by furnishing incitements to others to employ their utmost efforts to make beneficial discoveries, or to reveal for the common good, such as are already made.

The publick-spirited plan of the Society, instituted in London for the encouragement of arts, manufactures and commerce though the principal, and a very
eminent

eminent instance of this disposition, is not the only one, which has been carried into execution.—There are several country societies formed in an humbler way, to prosecute the same noble views: and which endeavour, in a similar manner, to increase or diffuse useful knowledge of the respective subjects. And, besides what is done by these collective bodies, many individuals strenuously exert themselves, in a private capacity, to cherish invention, and propagate intelligence in matters of this nature.

But vain are all these labours to cultivate experimental research, or collect information, if a proper channel be wanting to transmit the produce of them to the public; and convey it to those, for whose emolument it was intended.

Without this means, no fruit can be reaped from all those pains. It is to little purpose, that the encouragers of these improvements amass together all the intelligence in the world, if they only bury it in their own records and papers, where it soon falls into oblivion; or confine the effects of it to some particular persons or places, where its narrow influence can be but of little moment. This is, in fact, to waste time and money improvidently, not to say irrationally, in attaining those means of being serviceable to the public, which are not afterwards to be applied to any real end.

With regard to the London Society, the defect of such an opportunity of completing their purposes, is not the consequence, either of ignorance of its efficacy, or inattention to the procuring it: but of unlucky accidents, that have fallen in their way, and frustrated their views as to this point. It was, for some years, their declared intention, to have published, annually, an historical register: in which,
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the communications procured by their *premiums*, or made to them by spontaneous correspondents, were to have been given to the world. But several unforeseen difficulties prevented the putting this design in execution; and have, at length, so much evinced it not to be practicable with convenience, that they seem at present to have laid aside all thoughts of it. Some substitutive method of doing the same thing, is, therefore, absolutely necessary to render effectual their proceedings; especially as experience has now shewn, that one of the best ways to advance agriculture by means of their premiums, is to require not only the matter proposed should be done, but that information should be given, also, by the claimant, of the manner in which it was done; and of all the attendant circumstances, that may conduce to enable others to do the same. The importance of this kind of information is, indeed, so evident, that the Society, in a number of instances, offer their medals, which are esteemed the highest reward they can bestow, only for intelligence of the best methods of performance of the matter proposed, verified by experiments, without exacting any other task from the candidate. These are certainly very right measures to procure the desired knowledge: but such knowledge can never be rendered of any material service to the world, till the publication of some proper periodical work furnishes the opportunity of promulging it for general use. This work should be such, as may be open to receive all the respective communications; and become the known repository of them: in which they may be always found; and to which any, who shall have occasion for them, may easily have recourse.

It is to be regretted, as well on the score of the public, as for the sake of the Society itself, which has not, for this reason, acquired the whole honour due to it on many occasions, that no such work has
been

been hitherto established with their concurrence. In default of the publication of their historical register, a monthly periodical collection of essays and letters on agriculture, and commercial arts, was set up, without any connection with them, under the name *Musæum rusticum, & commerciale*; as a vehicle for all communications of this nature. The favourable reception, and support, that it met with, manifested the sense, which the world entertained of the expedience of such a work: and though it was not, in the earlier part of its duration, supplied with sufficient matter of adequate consequence; yet perhaps few circumstances in the present times have more contributed to create, and disseminate the taste for pursuits of this kind, or more assisted to the prosecuting them by the best methods, than that publication. But some occurrences respecting the æconomical management of it, and not any neglect or discouragement on the part of the public, occasioned the discontinuance of it above two years ago: and left those who apply themselves to the study or practice of agriculture, without any means of calling for the aid of instruction to get over the difficulties they may meet with; or of imparting, in a general way, what they believe may be advantageous for others to learn.

The above-mentioned reasons gave rise to a design of setting on foot a work adapted to these views; but more extensive than had been hitherto attempted. In order that the several Societies, particularly that of London, may have an opportunity of giving the world the benefit of their labours; and that the means may be restored, by which private individuals may disclose the result of their experiments, or observations to the public; or procure intelligence from others, on any points where it may be material to themselves, or their neighbours.

There

There are some other circumstances relative to modern improvements, that afforded still further inducements to the publishing this work, on account of the national good, to which it may be made subservient. The example of Great-Britain, and Ireland, has been followed by several other countries on the continent: and there are now a number of societies, and academies, in various places, that are instituted on the same system; and follow the same general methods of proceeding; except, that the greatest part publish some kind of *memoirs*, or *journal* of their own transactions, or the correspondence of private persons with them on the objects of their pursuit. Most of these works are sent to, or otherwise procured by the Society in London: but the community has hitherto had very little advantage from the contents of them: except that a translation of some selected pieces was published three or four years ago. It is not to be imagined, that the whole contained in these foreign memoirs, or journals merit notice here, where arts, as well as science, have made a much greater progress towards perfection. But several of the articles in them being communicated by very ingenious and philosophic men, who have applied themselves to experimental examination, as well as abstracted study, they of course sometimes furnish new and important lights. Moreover, notwithstanding we enjoy a superiority in general over other countries, in the improvement of most arts, yet particular places elsewhere possess certain matters of great utility, peculiar to themselves, of which the intelligence has not hitherto reached us: at least not in so full a manner as to make us practically masters of them. Some of the contents, therefore, of these foreign works are well worthy our attention, both with regard to speculation, and practice: since they may entertain us by their novelty, while we profit by their instruction. The
extrading.

extracting, consequently, from time to time, the valuable part of the essays, published by foreign societies, and academies ; and giving it in our own language, with such comments, or illustrations, as may render it more applicable to use with us ; cannot fail to have an essential tendency to the improvements we are cultivating.

There is yet another source of information relating to agriculture, that should not escape our notice. It is, the report made, from year to year, by, Mr. Wynne Baker, of the effects of his trials and experiments ; which are performed under the protection, and with the support of the Dublin Society ; and conducted by him with ingenuity and judgment. Though these reports are published by Mr. Baker in Ireland ; yet they come to the hands of very few here : but by their being inserted in this work, the public may reap the full advantage of them : as they will be thence laid open to all, who may wish to peruse them.

These are the present views, on which the intention of publishing this work was formed. The Society for the Encouragement of Arts, &c. were properly apprized of the plan of it : and they were pleased to make the following resolution.

June 17, 1767.

Resolved,

“ That, if the proposal for setting on foot a periodical work, under the title of *Memoirs of Agriculture, and other OEconomical Arts, &c.* be carried into execution, the Society will occasionally publish in it such pieces relating to agriculture, manufactures, and commerce, as they may think proper to lay before the public. And that liberty be hereby given, to specify the sense of this resolution in the title-page, and advertisements of the said work, in the following words : *The Society for the Encouragement of Arts, Manufactures, and*
“ Com-

*“ Commerce, will occasionally publish, in this work,
“ such pieces, as they shall think proper to lay before
“ the public.”*

But, besides the communications, which the Society itself may, in consequence of the above resolution, direct to be inserted in this work, it is intended to subjoin to them every other species of information, that may contribute to promote its final views. The earliest account will be presented of all the future premiums, they shall resolve to offer: and such explanations will be added, as may tend to render them most efficacious. A list will be, likewise, given with the same comments, of those, which at present stand subject to claims in the next or any succeeding year. This will be highly conducive to the success of these premiums. For, in order to make them fully effectual, it is necessary, that the nature of the subject, the reasons on which the utility is presumed, and the most feasible methods of performing or attempting the matter proposed, should be as much as possible made known. It is obvious from observation, that many persons, who have been passive from a supposed incapacity, would have had the spirit to undertake, and perhaps the ability to perform, the tasks required by the Society, if they had well understood the end and means: as also that many, who have made attempts, have miscarried from an ignorance of these particulars, or from unluckily mistaking the intention of the Society.

It is a principal part of the

Memoirs, to remove the

such influence

reasons, and instructions, which regard the subjects of the present premiums, without retrospection to several things past. These formed so considerable a part of the whole system of the Society's transactions, that it would have been disjointing and mutilating the parts, not to have comprehended the whole, in any disquisition respecting them. I have therefore, begun this work with a brief history of the Society's views, and proceedings, as to every article of encouragement, they have adopted, till the end of the year 1767; and of the success, and failure of their endeavours. I have prefixed an explanation of the general nature of the subject, and the reasons for adopting it; and subjoined such other remarks on the means of encouragement employed, and on the event of them, as may best tend to promote the completion of the views. This will render intelligible many particulars relating to the present and future premiums, that would be otherwise obscure and ambiguous; and, at the same time, throw a true light on the motives, and acts of the Society which, through the indispensable brevity of their advertisements, the necessity of adhering strictly to the conditions required in them, and the novelty or complexity of the intention in several cases, are, for want of such explanations, sometimes greatly misconceived.

The ample collection which the Society has made of *improved machines*, as well for other purposes, as those of agriculture, are lost to the public, in a great degree, till a proper account of them be published, in such manner, that those to whom they may be useful, may have an opportunity of knowing and procuring them. A catalogue of them will be, therefore given in this work, with such an explanation of their construction and use, as may tend to the introduction of them into general practice; and the best appli-

application of them to the purposes for which they are intended.

All other future occurrences, respecting the affairs of the Society, proper for the notice of the public, will be likewise related : and such elucidations subjoined, as may render the knowledge of them most serviceable to the world ; or advantageous to the interest of the Society itself. By this assistance, the operation of the premiums will be greatly assisted, and the views and transactions of the Society being more generally known, and better comprehended, it will receive a larger share of the due honour, and credit : which will undoubtedly conduce to its stability and flourishing state. This alone seems wanting to put the Society on the most respectable footing with the public. For whoever is well acquainted with the great amount of the funds, considered as a private subscription ; the assiduous attendance, and the qualifications of many of the members ; and the numerous instances of success in the very material improvements of agriculture, commerce, and the polite arts ; must acknowledge the Society to be the most illustrious example, of this kind, of a liberal, generous, patriotic spirit, exerted in adequate abilities for the execution of its noble purposes. This declaration of the great success of the Society's endeavours may appear exaggerated to such, as have had but little opportunity of knowing the particulars ; or have perhaps been prejudiced by those, who are fond of propagating the contrary opinion. But a just view of the Society's proceedings will shew it to be well founded : and I need only refer to the brief history of them, which makes the third article of this work : where by the great multiplicity of instances, found in the detail of facts, all, who attend to the perusal of them must be convinced.

In any part of this work where the Society's concerns may come in question, the greatest care

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will be taken to distinguish what is really inserted by their order, from the other matters which do not pass through their hands: that no part may be imputed to them but what is published by their authority: and that they may not be mistakenly made responsible for the productions of a private pen.

There is a collateral circumstance, also, respecting in some measure the Society, from whence this work may become a convenient receptacle of information, both to the correspondent and the public. In cases, where premiums are offered for accounts of the best methods of doing any matter proposed, or where the giving such accounts made a part of the conditions, the premiums can only be allotted to those, which are adjudged to have the preference: whereas there may be others, that may be very good; and perhaps even better in some particulars, though not in the whole, than those which gained the premium. Where this may happen, the Society cannot, nevertheless, with propriety publish any of these accounts, except those of such of the candidates as have obtained a premium: since they have no right to dispose of the rest. But whenever the other candidates may be desirous the world should have the benefit of their labours, a place will, at their request, be afforded to them, in these Memoirs, either as sent by a correspondent on the common footing, or by one of the Society's candidates, according as they themselves may chuse.

The other societies in our own country may avail themselves various ways of the channel of communication, which this work offers. They may, by asking it, obtain intelligence of what they find wanting in their own neighbourhood, to put them on a level with others in any particulars: or they may transfer to others a knowledge of the advantages they locally enjoy, or have procured by their efforts.

The

The causing experiments, and comparative trials to be made under their own inspection, for ascertaining many matters now doubtful, or for gaining original lights, is much more in their power than in that of the London Society : from whom, on the other hand, they may receive hints and instructions to the proper objects and manner of these trials. And, in this way of proceeding, they may do great service both to their own neighbourhood, and the world in general. It is almost incredible, how much scope of this kind there is for the application of comparative trials. Scarcely any of the most simple, and common points of practice in husbandry have been settled on demonstrative principles, founded on the calculation of the effects of various proportions, and methods accurately stated : as the very great variety of usages, and opinions, even in the same places, shew. Most of these dubious points might be, nevertheless, easily determined with a practical certainty, by a proper number of experiments, and it is scarcely to be believed, without some attention to a computation of these matters, what savings would accrue to individuals, and consequently to the public, from having these doubts cleared up ; and the most expedient and profitable methods of practice universally known.

The pieces selected from the foreign memoirs, and journals, introduced into this work, will be such as appear to have sufficient novelty, and importance, to be deemed worthy a republication here. And if any passage of moment occur, that is obscure, or too general and inexplicit for practical application, recourse will be had to the fountain-head whence the intelligence flowed, for such further explanation as may be required. The improvements, which the foreign societies themselves are daily undergoing, will render them in a short time a copious source

of useful information. And as they have borrowed their spirit and plan from us, we ought in our turn, to seek every advantage, that can be derived from the fruits of them.

All communications, from private individuals, of ingenious observations, or accounts of the result of experiments, and material facts relating to agriculture, gardening, or other useful arts, will have a grateful reception in these Memoirs; and be published in their due order, as they are sent. And it is hoped, that no person, who can furnish any information of this kind, which may be likely to prove of public benefit, will be deterred from imparting it, by a diffidence as to style, or ability of writing, on account of not being accustomed to such kind of compositions. For, if the sense only be intelligibly expressed by the correspondent, care will be taken, before the printing, to correct all the inaccuracies; and supply any defects of language, where needful. This intimation is the more necessary, as it is known, there are many, who, from a modesty in this point, have suppressed valuable discoveries, and observations, which they were, otherwise disposed to have made known.

It may be expedient, also, to mention here, that nothing personal nor foreign to the profest subjects of the work will be admitted into it. In writings of this kind, every party should be at liberty to maintain his own opinion, or oppose, by arguments, that of others, who differ from him. But the disputation should be restrained to the matter in question solely; and not suffered to degenerate into reflections on the writers or their abilities. The want of due regard to the preserving this regularity, and *decorum*, in the *Museum Rusticum*, which was too much neglected till the last half year, was an injury to that work. The wide deviations from the plan; futile criticisms,

criticisms, and tedious repetitions and replications on points of little consequence ; not to mention sarcasms, and censures unbecoming gentlemen to write of each other ; depreciated, in some measure, the value of the whole ; and would have brought it into discredit, had not many excellent pieces, from more sensible and liberal pens, compensated for the exceptionable part. If, therefore, any inadvertent expression or passage, that may tend to give disgust, or may carry the appearance of impropriety, shall escape from our correspondents, it is requested, they will excuse such expression's being softened ; or passages expunged, if not relative to the proper subject : as it is resolved to keep this work, as much as possible, free from every thing illiberal, trivial, or not pertinent.

Several gentlemen, who are engaged, with great spirit, in the improvements of husbandry by experiments in a very large way, have engaged to communicate the result of their labours. It is hoped, their example will incite others, likewise, to assist, in a pursuit of so much importance, as the advancement of agriculture is at present in our country. But the ability of being serviceable to the publick, in this way, is not limited to those, who have opportunity, or inclination to make trials and experiments, or to apply themselves to theoretic speculations. It is not, by the invention of new matters only, that this great end may be promoted. For the rendering more general, in many cases, the knowledge of the best methods now followed, the practice of which is confined to particular places, or countries, is another not less effectual means. The information wanted to the public in such points may be easily given by those who have a constant occasion to survey the object ; and in this way, very great good may be done to the world with very little trouble to the writer.

To conclude, every other means will be employed, to render these Memoirs extensively beneficial to the public, as well with respect to the advancement of agriculture, as all inventions, or improvements of other matters, that properly fall within the cognizance of the plan. And it is presumed, that not only Great-Britain, and Ireland, may reap considerable advantages from it; but that the colonies, also, may partake of them, even in a yet more essential manner: as they have a greater necessity for such help. The honour, as well as the interest of our country, is highly concerned in the establishment of such a work, since we should justly incur the imputation of a faulty supineness in that point, if we were longer to neglect this obvious means of promoting improvements of the utmost consequence to our welfare; which almost every other civilized state has adopted, even with the *immediate assistance of government*. We hope, therefore, the publication of these Memoirs will have the aid of the ingenious and the encouragement of the public spirited; that we may be enabled to shew by their merits, and success, our country is not less attentive in this, than in other particulars, to maintain the superiority, which at present distinguishes us in *science*, and *æconomical arts*, as well as *arms*, from all our neighbours and rivals.

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M E M O I R S
O F
AGRICULTURE,
A N D O T H E R
O E C O N O M I C A L A R T S.

A R T I C L E I.

A LIST of all the Premiums, Bounties, &c. relating to Agriculture, Manufactures, Mechanics, Chemistry, and Trade, given by the Society for the Encouragement of Arts, Manufactures, and Commerce, from their institution, to the end of the year 1767. Inserted at the Desire of the Society.

THIS List of premiums and bounties is inserted here, not only in conformity to the desire of the Society, but for the following reasons:

I. That it will be a satisfaction to the rational curiosity of many, to be informed of all the objects of encouragement of the kinds here enumerated, for which the Society have actually given rewards; of the respective mode, quantum, &c. of those rewards; and of the names of the persons on whom they have been bestowed.

II. That it will serve to illustrate several matters in the sequel of these Memoirs, particularly in the following brief history of the Society's transactions, to see the chronological order of the rewards given for each object; and to be enabled thence to form a judgment of the progress of the success of the Society's premiums, and proceedings with regard to it.

III. That, information being thus furnished of all the various attainments of inventions, and improvement, every person to whom any of them may be particularly useful, will be, by that means, put in the way of applying them to their advantage.

IV. That, with regard to agriculture, the success and extent of the several attempts, and trials, in the culture of new articles being displayed, it may shew how far they may be considered as the grounds of encouragement



couragement for introducing such articles into practice : and the names of those who have made these trials, or attempts, being here supplied, an opportunity is afforded in many cases of obtaining such information or assistance from them, as may greatly conduce to surmount the difficulties, others may find in their endeavours at the same performances.

To ROBERT DOSSIE, Esq;

SIR,

I am directed by the Society for the Encouragement of Arts, Manufactures, and Commerce, to send you the following list of all the premiums relating to agriculture, manufactures, mechanics, chemistry, and trade ; in order to their being published in the Memoirs of Agriculture, if you think proper.

By Order of the Society,

March 8, 1768.

CEO. BOX,

Assistant Secretary.

A List of all the Premiums, Bounties, &c. relating to Agriculture, Manufactures, Mechanics, Chemistry, and Trade, given by the Society for the Encouragement of Arts, Manufactures, and Commerce, from the Beginning of the Society, to the End of the Year 1767.

PREMIUMS relating to AGRICULTURE.

1755.

Madder, for raising and curing 20 lb. of good, Mr. Thorp, 30 l.

1758.

Madder, for producing the largest roots of three years growth, 20 in number, Mr. Nic. Crisp, 20 l.

Ditto, for ditto, of one year's growth, Mr. Shaw, 16 l.

Ditto, for ditto, of two years growth, Mr. John Rose, 10 l.

Madder, for producing the largest roots of one year's growth, Mr. Suter, 8 l.

Acorns. for sowing 23 acres, the duke of Beaufort, a gold medal.

1759.

Madder, for producing the largest roots, more than 20 in number, Mr. John Suter, 26 l.

Ditto, for ditto, Mr. Samuel Shaw, 20 l.

Ditto, for ditto, Mr. Brownton, 8 l.

Acorns,

Acorns, for sowing 23 acres, 1 perch, with 101 bushels 1 peck, and 1 acre, 2 roods, 2 perches, with 4 bushels, Dennis Rolle, esq. a gold medal.

Ditto, for sowing 21 acres, 10 perches, Philip Carteret Webb, esq. a silver medal.

Ditto, for sowing 5 acres, and upwards, John Berney, a silver medal.

Ditto, for sowing 10 acres, 3 roods, 8 perches, with 49 bushels, 2 pecks T. Drew, a silver medal.

1761.

Madder, for planting above 10 acres, William Kemp, 50 l.

Scotch Fir, for planting 101394, Dennis Rolle, esq. a gold medal.

Ditto, for planting 24000, Rob. Sutton, a silver medal.

Ditto, for planting 6000, Matthew Lee, a silver medal.

1762.

Acorns, for sowing 20 $\frac{3}{4}$ acres, 8 roods, Lord Winterton, a gold medal.

Ditto, for sowing 11 acres, 3 roods, 20 poles, Duke of Bedford, a silver medal.

Stocks of Bees, for the greatest number, being 223, Thomas Fawcet, a gold medal.

Ditto, for the next greatest, being 110, Thomas Clarke, a silver medal.

1763.

Lucerne, for sowing about 16 acres, Humphry Sturt, 20 l.

Ditto, for sowing 7 acres, Col. Taylor, 50 l.

Hemp, for sowing 15 acres, 2 roods, 3 perches, John Davy, 30 l.

Ditto, for sowing 12 acres, 1 rood, 14 $\frac{1}{2}$ perches, Giles Hawkins, 10 l.

Ditto, for sowing 66 acres, 3 roods, 15 perches, James Higgins, 40 l.

Ditto, for sowing 14 acres, 1 rood, 4 perches, John Woolmorton, 20 l.

Madder, for planting 1 acre, John Cooke, 5 l.

Ditto, for planting 1 acre, Wm. Trevillian, esq. 5 l.

Ditto, for planting 3 acres, Mr. William Wilcocks, 15 l.

Ditto, for planting 29 acres, Mess. Kemp and Lane, 145 l.

Ditto, for planting 1 acre, Mr. Wm. Faviman, 5 l.

Ditto,

Madder, for planting $4\frac{1}{2}$ acres, John Thorpe, 22l. 10s.

Ditto, for planting 3 acres, Rev. Mr. Barber, 15 l.

Ditto, for planting 1 acre, John Simmons, 5 l.

Ditto, for planting 1 acre, Mr. J. Harrison, 5 l.

Ditto, for planting 10 acres, Mr. William Hutchins, 50 l.

Ditto, for planting 1 acre, Messrs. Humphrey and Vinal, 5 l.

Ditto, for planting 1 acre, Rev. Mr. Peel, 5 l.

Ditto, for planting 1 acre, Mr. Wm. Pickerin, 5 l.

Ditto, for planting $3\frac{1}{4}$ acres, Mr. Ja. Cole, 16 l. 5 s.

Madder, for planting 1 acre, Daniel Colgate, 5 l.

Ditto, for planting 2 acres, Joseph Mace, 10 l.

Ditto, for planting 6 acres, Geo. Foster Tuffnell, esq. 30 l.

Elms, for planting 6100 plants, the earl of Portsmouth, a gold medal.

Chestnuts, for planting 2 acres, 3 roods, 12 perches, John Freeman, esq. a gold medal.

Ditto, for planting upwards of 5 acres, Geo. Foster Tuffnell, esq.; a gold medal.

Scotch Fir, for planting 30,000 plants, Francis Trotman, a gold medal.

Ditto, for planting 16,000 plants, Thomas Batchelor, esq. a silver medal.

Ditto, for planting 16000 plants, the duke of Bedford, a silver medal.

Bee Hives, for having 185, Thomas Fawcett, a gold medal.

Ditto, for having a 128, Thomas Clarke, a silver medal.

1764.

Acorns, for sowing 22 acres, John Buxton, esq. of Rushford, Norfolk, a gold medal.

Scotch Fir, for planting 104000 plants, Robert Fenwick, esq. Lemington, Northumberland, a gold medal.

Ditto, for planting 14000 plants, John Mount, esq. Wasing, Berks, a silver medal.

Lucerne, for sowing 13 acres, 23 rods, John Vallance, of Patcham, Sussex, 20 l.

Ditto, for sowing 12 acres, 3 roods, 11 rods, James Bedell, of North Cray, Kent, 15 l.

Carrots, for sowing 30 acres, 2 roods, Mr. Rob. Billing, of Weasenham All Saints, Norfolk, 20 l.

White

White Clover Seed, for sowing 21 Cwt. 1 qr. 13 lb.
John Freeman, esq. of Chute-lodge, Wilts, 20 l.

Madder. 5 l. for every acre planted, to the following candidates, viz.

1 Acre, Mr. Francis Harris, of Iver, Bucks.

1 Acre, 24 rods, Mr. John Goddard, of Ditchling, Suffex.

15 Acres, Mess. Abr. Prebble and Jos. Royle, of St. Mary North-gate, Canterbury.

2 Acres, Everard Buckworth Herne, esq. of Haverland, Norfolk.

1 Acre, Mr. Francis Buti, of Birchington, Thanet.

1 Acre, Rev. Mr. John Peele, of Tinley, Norfolk.

2 Acres, Mr. John Ranson, of Stowmarket.

7 Acres, Mess. John Lane and William Kemp, of Teynham, Kent.

2 Acres, Mr. John Simmons of Preston, Kent.

1 Acre, Mr. James Cole of Ditchingham, Norfolk.

3 Acres, Mr. Francis Crumpe, of Battersea, Surry.

1 Acre, Mr. Jacob Patterson, of Whitham, Essex.

1 Acre, 27 rods, Mr. Joseph Flight, of Bermondsey, Surry.

2 Acres, Mr. John Flight, of Thames-Ditton, Surry.

2 Acres, William Hutchins, esq. of Barn-Elms, Surry.

2 Acres, Mr. Wm. Cossé, of Ringwood, Hampshire.

Hemp, for sowing 35 acres, 37 perches, Joseph Higgins, of Preston, Salop, 40 l.

Ditto, for sowing 19 acres, 3 roods, 16 perches, John Ellmere, of the parishes of St. Julian or Pontbury, Salop, 30 l.

Hemp, for sowing 43 acres, 3 rood, 10 perches, and 20, John Davy of Yeovil and West Coker, Somerset, 30 l.

Ditto, for sowing 31 acres, Giles Hawkins, of East Chinnock and West Coker Somerset, 10 l.

Bee Hives, for having 124 stocks, Mr. Thomas Fawcett Oxque, Yorkshire, a gold medal.

Ditto, for having 105 stocks, Mr. Thomas Haynes, of Oundle, Northamptonshire, a silver medal.

Burnet, for the improved culture of, Mr. Roque, of Walham-green, a bounty of 50 l.

Plough for turning up heath-ground; and a *Horse-thistle-cutter*, for inventing, Mr. Ringrose, a bounty of 10 guineas.

1765.

Elms, small leaved English, for planting 1490, William Earle, esq. of Malmesbury, Wilts, a gold medal.

Scotch Fir, for planting 102000, Robert Fenwick, esq. of Lemington, Northumberland, a gold medal.

Carrots, for sowing 24 $\frac{1}{2}$ acres, Robert Billing, of Weasenham, Norfolk, 20 l.

White Clover Seed, 1009 lb. wt. produced on 14 acres, Thomas Hasker, of Sherfield-upon-London, Hants, 20 l.

Burnet, for sowing 8 acres, 1 rood, 8 perches, Rev. Mr. Davies Lamb, rector of Ridley near Dartford, Kent, 20 l.

Ditto, for sowing 5 acres, 1 rood, 4 rods, Mr. Richard Scrase, of Withdean, Suffex.

Madder, 5 l. for every acre planted to the following candidates, viz.

4 Acres, John Harrison, of Preston, Kent.

2 Acres, John Simmons, of Preston, Kent.

1 Acre, Arthur Young, esq. of Bradfield, Suffolk.

2 Acres, Joseph Flight of Battersea, Surry.

1 Acre, John Thorp, of Thames-Ditton, Surry.

1 Acre, Rev. Bariah Brook, of Rede, Suffolk.

2 Acres, John Cooke, esq. of Tunbridge, Surry.

1 Acre, Rev. John Barber, of Great Chesterford, Essex.

1 Acre, John Suter of Barnes, Surry.

1 Acre, Jos. Talmin, of St. Leonard's, Bromley.

15 Acres, William Hutchins esq. of Barnes, Surry.

1 Acre, Francis Crumpe of Battersea, Surry.

1 Acre, Rev. John Peele, of Tilney, Norfolk.

2 Acres, George Payne, esq. of Weybridge, Surry.

Hemp, for sowing 37 acres, Giles Hawkins, of West-Coker, Somerset, 40 l.

Ditto, for sowing 29 acres, John Davy, of ditto, 30 l.

Ditto, for sowing 10 acres, William Preston, of Crowland and Whapload-Drove, Lincolnshire, 20 l.

Ditto, for sowing 18 acres, Jos. Higgins, of Preston, Salop, 30 l.

Ditto, for sowing 15 acres, John Elsmere, of Shrewsbury, 20 l.

Ditto, for sowing 15 acres, Samuel Elsmere, of Almond Park, Salop, 10 l.

Bee Hives, for having 182 stocks, Mr. Thomas Fawcett, of Oxque, Yorkshire, a gold medal.

Bee

Bee-hives, for having 150 stocks, Mr. Thomas Harvey, of Elmond, Essex, 10 l.

Machine for dressing Wheat and Malt, before they are ground, Mr. Robert Mackell, a bounty of 50l.

Machine for threshing Corn, used in Connecticut, Mr. Harvey, a bounty of 15 l.

1766.

Acorns, for sowing 37 acres, Blunden Moore, esq. of Byfleet, Surry, a gold medal.

Elms, small leaved English, for planting 2140, John Freeman, esq. of Chute-lodge, Wilts, a gold medal.

Scotch Fir, for planting 100,000, Robert Fenwick, esq. of Lemington, Northumberland, a gold medal.

Ditto, for planting, 18,000, Lord Scarfdale, a silver medal.

Burnet, for sowing 37 acres, John Scarancke, esq. of Hatfield, Hertfordshire, 20 l *.

Ditto, for sowing 16 acres, Christopher Baldwin, esq. of Clapham-common, Surry, 15 l.

Ditto, for sowing upwards of 10 acres, Robert Barber, esq. of Gover, near Exeter, 10 l.

Grass Seeds, for gathering by hand, viz.

Meadow-Foxtail, Mr. William Judge, Widford, Essex, 5 l.

Crested Dogs-Tail, Mr. Edward Birch, of Stone-Easton, Somerset, 5 l.

Ditto, Mr. William Goffe, of Ringwood, Hants, 3 l. 3 s.

Barley, &c. For an account of the most profitable method of cultivating, Sir Digby Legard, bart. of Ganton, Yorkshire, a gold medal.

Wheat, for ditto, Rev. Mr. H. Lowther, rector of Aikten, a gold medal.

Lucerne, for ditto, William Taylor, esq. of Cannon-hill, Surry, a gold medal.

Turneps, for ditto, Mr. John Willy, South Pether-ton, Somersetshire, a gold medal.

Bee Hives, for having a number of stocks, not less than 30, to each of the following persons, 5l. viz.

William White, of Shetford, Oxon, 32 stocks.

* Mr. S. M. Scarancke relinquished the premium: and a gold medal was presented to him by the Society, as below.

- John Edmonds, of Rudston, Yorkshire, 38.
 Thomas Shovelar, of Bishopsbourn, Kent, 35.
 James Snelling, of Working, Surry, 35.
 John Howard, of ditto, 32.
 Mary Pitches, of Eaning, Suffolk, 30.
 Thomas Fawcet, of Oxque, Yorkshire, 122.
 Richard Jenison, of Market-Weighton, Yorkshire, 31.
 Robert Bruce, of Ford, Northumberland, 33.
 Jonathan Satchell, of Kettering, Northampton-shire,
 39.
 John Short, of Chilbolton, Southamptonshire, 36.
 John Pendred, of Wellingborough, Northamptonshire,
 42.
 William Gilbert, of Exning, Suffolk, 32.
 Thomas Clarke, of Sunning-hill, Berks, 78.
 Benjamin Harris, of Aston Tirrold, Berks, 30.
 Richard West, of South Reston, Lincolnshire, 75.
 Thomas Young, of Waltham-croft, Hertfordshire, 34.
 Andrew Turner, of Elvetham, Hants, 30.
 John Winter, of Creat Gonerby, Lincolnshire, 30.
 Peter Daley, of Woodbury, Devon, 45.
 Nathaniel Cory, of Bugbrook, Northamptonshire, 30.
Drill Plough, for inventing, Rev. Mr. H. Gainfborough,
 of Henley, Oxon, 30 l.
Ditto, for inventing, Mr. James Willy, of South
 Petherton, Somersetshire, 20 l.
Machine for turning up gravel in walks, for inventing,
 Mr. Edward Cooper, of Kensington, Middlesex, a boun-
 ty of 10 guineas.
 1767.
Drain Plough, for inventing, Mr. Cuthbert Clarke,
 of Belford, Northumberland, 50 guineas.
Spanish Chestnuts, for setting 12000, Lord Viscount
 Turner, a gold medal.
Elms, small leaved English, for planting 2000, Earl
 Winterton, a gold medal.
Grass Seeds, for gathering by hand, viz.
Meadow-Fescue, Mr. Tho. Stacey, of Mitcham, Sur-
 ry, 10 l.
Ditto, Mr. Wm. Goffe, of Ringwood, Hampshire, 2
 guineas.
Vernal Grass ditto, 10 l.
Ditto, Mr. William Goffe, 2 guineas.
Crested Dog's-tail, Mr. William Black, 10 l.

Ditto,

Ditto, Mr. James White, of Leigh on Mendip, Somersetshire, 5 l.

Madder, 5 l. for every acre, to each of the following persons, viz.

1 $\frac{1}{2}$ Acre, Mr. John Lane, of Teynham, Kent.

8 Acres, William Hutchins, of Barnes, Surry.

1 Acre, John Harrison, of Preston, Kent.

1 Acre, John Dudlow, of St. Mary North-gate, Canterbury.

1 Acre, Broome Witts, of Chippingnorton, Oxon.

1 Acre, Thomas Parsons, of Taunton, Somersetshire.

1 Acre, Rev. Daniel Hill, of East Malling, Kent.

1 Acre, William Fairman, of Tonge, Kent.

15 Acres, Joseph Flight, of Compton, Surry.

1 Acre, James Johnson, of Great Shelsley, Worcester-shire.

1 Acre, Thomas Giles, of Erabourne, Kent.

1 Acre, Charles Rose, of St. John, Devizes.

1 Acre, Arthur Young, of Bradfield Combrest, Suffolk.

1 Acre, Jos. Royle and Abraham Prebble, of St. Mary Northgate, Canterbury.

1 Acre, William White, of Ide, near Exeter.

Plough for draining lands, for inventing, Mr. Knowles, of the Isle of White, 50 guineas

Machine for slicing turneps, for inventing, Mr. James Edgell, of Frome, Somersetshire, 20 l.

Scotch Fir, for planting 46000, Mr. John Wright, of Lombard-street, London, a gold medal.

Turnep Cabbage, for cultivating, Robert Colville, esq. of Newton, in the Isle of Ely, Cambridgeshire, 20 l.

Madder, for cultivating, John Arbuthnot, esq. of Mitcham, Surry, was presented with a gold medal.

Burnet, for having sown 37 acres, John Searancke, esq. of Hatfield, Hertfordshire, was presented with a gold medal.

Trenching Plough, and a *Three Furrow Plough*, for inventing, Mr. Duckett, a bounty of 50 l.

PREMIUMS relating to MANUFACTURES.

1755.

Buff Leather, for making of 5 ox-hides dressed in oil, which appeared equal to the foreign buff, Mr. Bullock, 10 l.

C

Copper,

Copper, for tinning, in a perfect manner, Mr. Bootie, 10 l.

1757.

Engliff Carpets, for the best, in imitation of the Turkey, Mr. Moore, 25 l.

Ditto, Mr. Whitty, 25 l.

Paper for Copper Plates, nearest to the French, Mr. Taylor, 7 guineas.

1758.

Engliff Carpets, for the best, in imitation of the Turkey, Mr. Whitty, 25 l.

Ditto, Mr. Passavant, 25 l.

Work-houses, for publishing a book on, Mr. William Bailey, 50 l.

1759.

Worsted Yarn, for spinning, John Sculfer, 15 l.

Linnen Yarn, for spinning, Robert Price, 10 l.

Drugget fit for the Lisbon market, for making, George Walker, 10 l.

Ditto, Mess. Williams and Penwaine, 20 l.

Silk Paper, for making the greatest quantity, Mr. Clement Taylor, 20 l.

Ditto, the next greatest, Mr. Wm. Quelch, 10 l.

Cotton, for spinning in Luton work-house, Wm. Hay, 10 l.

Engliff Carpets, for making the best, in imitation of the Turkey, Mr. Tho. Whitty, 30 l.

Ditto, for the next best, William Jeffer, 20 l.

Engliff Mill-stones, for producing the best, Mr. Wainwright, 15 l.

Ditto, for the next best, Henry Watson, 10 l.

Catgut, for twisting to make strings for musical instruments, Mrs. Laroach, a bounty of 6 guineas.

Ditto, Mr. Rob. Williams, a bounty of 6 guineas.

1760.

Worsted Yarn, for spinning, Richard Neale, 12 l.

Linnen Yarn, for spinning, Robert Price, 20 l.

Worsted Yarn, for spinning, in Quakers Work-house, Clerkenwell, Leonard Snowden, 8 guineas.

White Enamel, for making, Isaac Nerbell, a bounty of 10 guineas.

Drugget for the Lisbon-market, for making the best, John Pike, 20 l.

Silk

Silk Paper, for making the greatest quantity, James Simmons, 20 l.

Ditto, for the next greatest, Fr. Chapman, 10 l.

Silk Grass, for manufacturing, John Thomas, a gratuity of two guineas.

1761.

Linnen Yarn, for spinning, in Plymouth Work-house, Thomas Perren, 20 l.

Fine Linnen Yarn, for spinning, Jarret Wilson, a bounty of 5 guineas.

Spinning Wheel, for the greatest improvement of, Thomas Perren, 10 l.

Ditto, for the next greatest, John Webb, 20 l.

Drugget for the Lisbon market, for making the best, Mr. Jam. Maynard, 20 l.

1762.

Point Lace, for information relating to, Mrs. Dorothy Holt, 10 guineas.

Worsted Yarn, for spinning, Robert Rice, 20 l.

Fine Linnen Yarn, for spinning, Jarret Wilson, 5 guineas.

Long-shed Spinning Wheel, for the greatest improvement of, Thomas Perren, 30 l.

Linnen Yarn, for spinning from fine flax, John Vaux, 30 l.

Cbip-Hats like the Italian, for making the best, Sarah Meyer, 10 guineas.

Ditto, for the next best, Benj. Slim, 5 guineas.

Reel for winding silk from the cocoons, for the invention of, Mr. Verrier, a bounty of 40 l.

Druggets for the Lisbon market, for making the best, John Maynard, 30 l.

Quilting in the loom in imitation of the Marseilles and Indian quilting, for the best specimen, Obadiah Rider, 40 l.

Ditto, for the next best, Joseph Barnes, 20 l.

1763.

Paper for copper-plates, nearest in quality to the French, for making, Thomas Cook, 25 l.

Point Lace, for making Miss La Croix, 10 guineas.

Ditto, for making, Miss Dallas, 12 guineas.

Ditto, for making, Miss Mary Parker, a bounty of 10 guineas.

Ditto, for making, Miss Hester Bootie, 8 guineas.

Fine Linnen Yarn, for spinning, Hannah Demstane, a bounty of 5 guineas.

Marbled Paper, for making the best, Mess. Portbury and Smith, 50 l.

Chip Hats like the Italian, for making the best, Mary Stephens, 3 guineas.

Comb Pot, for inventing, Samuel Hayward, jun. a bounty of 30 guineas.

Spinning Wheel for six threads, for inventing, George Buckley, a bounty of 20 guineas.

1764.

Chip Hats like the Italian, for making the best, Benj. Slim, 5 guineas.

Chip Hats, like the Italian, for making the next best, Mary Dorrington, 3 guineas.

Paper for Copper Plates, nearest in quality to the French, Mr. Tho. Cooke, of Tottenham, 25 l.

Point Lace, for making, Mrs. Mary Parker, 15 guineas.

Ditto, Mrs. Esther Booty, 8 guineas.

Ditto, Mrs. Mary Booty, 5 guineas.

Quilting in the Loom in imitation of the Marseilles and Indian quilting, for the best, Mr. Humph. Slim, of Friday-street, London, 50 l.

Ditto, for the next best, Mr. Jos. Shaw, of Bolton, Lancashire, 30 l.

Ditto, for the third best, Mr. Mich. Badge, of Spital-fields, London, 20 l.

Horizontal Spinning Wheel, for the improvement of, Mr. William Harrison, of East-street, Red-Lion-square, 50 l.

Fine Linnen Yarn, for spinning, Mrs. Hannah Dunstone, of South-Petherton, Somerset, 8 guineas.

Ditto, Mrs. Eliz. Bishop, of Crewkerne, Somersetshire, 5 guineas.

Embossed Paper, for the invention of the art of making, Mr. Benjamin Moore, Newgate-street, a bounty of 50 guineas.

Lace with knitting-needles, for the invention of the art of making, Mrs. Mary Whiteside, a bounty of 10 guineas.

1765.

1765.

Quilting in the Loom, Silk, Cotton, or Linnen, for the greatest improvement of, Benjamin Slim, of Golden-lane, Old-street, London, 50 l.

Quilting in the Loom, Silk, Cotton, or Linnen, for the next greatest, Joseph Shaw, of Bolton, Lancashire, 30 l.

Ditto, for the third greatest, Jonathan Baker, of Booth-street, Spital-fields, London, 20 l.

Quilting in the Loom, Woollen, for the greatest improvement of, Nicholas Pearfal, of Kidderminster, 50 l.

Ditto, for the next greatest, John Parrock, of Booth-street, Spital-fields, London, 30 l.

Ditto, for the third greatest, James Clifton, of Webb-square, Shoreditch, 20 l.

Spinning Wheel, for the greatest improvement of, Thomas Perren, master of St. Sepulchre's work-house, 20 l.

Chip-Hats like the Italian, for making the greatest quantity of the best, Benj. Slim, of Golden-lane, Old-street, 3 guineas.

Fine Linnen Yarn, for spinning, Eliz. Bishop, of Crewkerne, Somersetshire, 5 guineas.

Stocking Frame, for the improvement of, Samuel Unwin, of Sutton, Nottinghamshire, 80 l.

Machine for winding and doubling Worsted, &c. for the improvement of, Jer. Burrows, of Southwark, 10 l.

Ditto, William Caiger, at the academy, Guildford, 10 l.

Thread Lace, for knitting the best, Elizabeth Boulton, of St. Martin's Le Grand, 10 guineas.

Tanning with Oak Saw-dust, for revealing the method of, Mr. John Eldridge, of Battle, Sussex, a bounty of 100 l.

Point Lace, for making, Miss Theodosia Burgeois, of Derby, a bounty of 10 guineas.

Irons for drawing Gold, Silver, and Brass Wires, for improving, Mr. Waller, a bounty of 10 guineas.

1766.

Spinning-Wheels, for the greatest improvement of, William Garrat, 30 l.

Ditto, for the next greatest, — Webb, 15 l.

Cleansing brown Osnaburgs, like the foreign, for shewing the method of, Samuel Unwin, of Sutton, Nottinghamshire, 25 l.

Stocking Frame, for the greatest improvement of, John Whyman, of Aston upon Trent, near Derby, 100 l.

Machine for winding and doubling Thread, Worsted, and Cotton, for improvement of, William Garrat, 12 l.

Thread Lace, for knitting best, Mrs. Eliz. Boulton, of Dean's Court, St. Martin's Le Grand, 12 guineas.

Ditto, the next best, Miss Elizabeth Gordon, of Folkestone, Kent, 4 guineas.

Ditto, the third best, Mrs. Mary Whiteside, of Lancaster, 4 guineas.

1767.

Fine Linnen Yarn, for spinning, Eliz. Bishop, of Bridport, Dorset, 12 guineas.

Crayons, for a new method of preparing, Mr. Robert Stanley, a bounty of 20 guineas.

PREMIUMS relating to MECHANICS.

1757.

Hand-Mill, for the greatest improvement of, Peter Lyon, 25 l.

Ditto, for the next greatest, Mr. J. Gordon, 25 l.

1758.

Hand-Mill, for the greatest improvement of, Mr. Parsons, 50 l.

1760.

Curious Locks, for the invention of two kinds of, Edward Gascoigne, a bounty of 10 guineas.

Ship-Blocks, for the best model of, Jos. Aldridge, 30 l.

Tide-Mill, for the greatest improvement of, Richard Lewis, 20 l.

Ditto, for the next greatest, Jos. Nicholls, 20 l.

Windmill, for the greatest improvement of, Jos. Nicholls, 50 l.

1761.

Machine for boring Auger Holes, Mr. Wm. Bailey, a bounty of 50 l.

Crane, for the improvement of, John Galabine, a bounty of 20 guineas.

Tide-Mill, for the improvement of, Rev. Mr. Humphry, of Gainsborough, 60 l.

Ditto, Mr. R. Lord, a bounty of 10 guineas.

Wind-Mill, for the improvement of, Mr. Lewis, 50 l.

Threshing-

Threshing-Machine, for inventing, Mr. C. Lloyd, 15 l.

Hand-Mill, for the improvement of, a bounty to ditto, 50 l.

Machine to weave Brocades, for improvement of, Nich. Sebastian Favier, a bounty of 3 guineas.

Saw-Mill, for erecting and working the first year, James Stansfield, 100 l.

1762.

Cyder-Mill and Press, for the improvement of, Mr. Charles Lloyd, 20 guineas.

Wind-Mill, for the improvement of, Mr. James Verrier, a bounty of 50 l.

Crane, for the improvement of, James Ferguson, a bounty of 50 l.

Tide-Mill, for the improvement of, Jos. Coulthard, 20 guineas.

Fish-Carriage with four Wheels, for inventing, Steph. Boulton, 20 l.

Ditto, with two Wheels, for inventing, Stephen Boulton, 14 l.

Ditto, for the next best, Mr. Joachim Smith, 7 l.

Machine for planeing cast Iron, for invention of, George Weldon, a bounty of 30 guineas.

1763.

Curious Locks, for inventing of, John Moore, a bounty of 20 guineas.

Saw-Mill, for keeping at work 2d and 3d year, James Stansfield, 75 l.

Model of a Saw-Mill, purchas'd of ditto, 100 l.

Ship-Blocks, for the first in merit, Nehem. Nisbett, 60 l.

Ditto, for the second, William Oxenham, 20 l.

Ditto, for the third, Mr. William Constable, 10 l.

1765.

Saw-Mill, for keeping at work the 4th year, James Stansfield, 25 l.

Method to prevent Four-wheeled Carriages overturning, for inventing, Thomas Cotton, of Chigwell, Essex, a bounty of 20 guineas.

Four-wheeled Carriages, for an improvement of, Mess. Cranefield, a bounty of 30 guineas.

1766.

Copper-Plate Printing-Press, for an improvement of, Mr. Buffam, a bounty of 10 guineas.

Cranes, for the improvement of, Mr. Samson, a bounty of 10 guineas.

A Machine for grinding and polishing Glass, Jeremiah Burrows, 70 l.

Land Quadrant, for the improvement of, Mr. Hoskins, a bounty of 10 guineas.

Saw-Mill, addition of a cross-cutting saw to the model of, Mr. Stansfield, 10 guineas.

Machine for raising Water by Wind, for inventing, Mr. B. Merriman, a bounty of a silver medal.

Hanging Gates and Doors, for improvement in, Mr. John Orme, a bounty of 10 guineas.

1767.

Instruments to gauge Vessels, for the improvement of, Mr. Efford, a bounty of 20 guineas.

Pump for extracting Water out of Ships, for the greatest improvement of, Mr. Charles D. Bowden, Blackfriars-bridge, Surry, 100 l.

Perambulator, or Instrument for easily measuring Ground, for the invention of, Mr. Edgeworth, Harehatch, Berkshire, a bounty of a silver medal.

Compass and Protractor, for the improvement of, Aaron Miller, a bounty of 10 guineas.

Machine for slicing Turneps, for the improvement of, Mr. W. Bailey, a bounty of 10 guineas.

Wheel Crane, for an improvement of, by an addition for preventing fatal accidents to the men, Mr. Christ. Pinchbeck, a bounty of a gold medal.

Invention of a Method for preserving the Lives of Sailors and Cargoes of Ships when cast away, Mr. John Wynn, a bounty of a silver medal.

PREMIUMS relating to CHEMISTRY, &c.

1755.

Cobalt, for producing from a British mine, Mr. Beauchamp, of Truro, 30 l.

1758.

Verdigrise, for making 100 lb. wt. Mr. Jacob Hagen, jun. 20 l.

1759.

Staining Marble, for improvements in, Mr. Herbert Chambers, 10 l.

Crucibles,

A G R I C U L T U R E.

41

Crucibles, for making in England, Jean Sifferth, 30 l.

Earthen Retorts, for making, Henry Richards, 20 l.

For sending abroad, and keeping Account of Experiments on Planks prepared with a composition for securing Ships Bottoms from Worms, Dr. Lockman, a gold medal.

1761.

Crucibles, for making, William White, 30 l.

Train Oil, for revealing processes for edulcorating, Robert Dossie, esq. 100 l.

Dying Cotton Yarn a Turkey red, for inventing of, John Wilson, 50 l.

1762.

Crucibles, for making in England, Jacob Lieberich, a bounty of 20 guineas.

Papin's Digester, for improving, David Creagh, a bounty of 30 guineas.

1763.

Verdigrife, for making the greatest quantity of, John Bindley, esq. 50 l.

Composition to prevent Steel from rusting whilst manufacturing, for inventing of, John Monk, 20 l.

Varnish like Martin's, for making, Mr. Stephen Bedford, 15 l. part of the premium.

1764.

Zaffre and Smalt, for making, Nicholas Crisp, Bowchurch-yard, London, 50 l.

Substitute for Borax, for inventing of, Edward Carter, a bounty of 10 l.

Verdigrife, for making the greatest quantity, and the best, John Bindley, esq. 100 l.

Salt-Petre, for making in America, Jeremiah Brown, Virginia, a bounty of 50 l.

Dying Cotton Yarn Turkey red, for invention of, Simon Spurrett, of Isleworth, Middlesex, 100 l.

1766.

Cotton and Linnen Yarn, green, for dying the best, Humph. Jackson. 20 l.

Crucibles, for making in England, Jacob Lieberich, 50 l.

1767.

Linnen Yarn, yellow, for dying the best, T. Griffel, 40 l.

Ditto, green, for dying the best, Thomas Griffel, 20 l.

Leather,

Leather, red and yellow, for revealing the manner of dying, as practised in Turkey, Mr. Phillippo, an Asiatic, 100 l.

For introducing the Eastern red and yellow Dyes of Leather into Great Britain, Mr. Phillippo, a gold medal presented.

PREMIUMS relating to TRADE and COLONIES.

1755.

Mulberry Trees, for raising in Georgia, 18 l. remitted by B. Martin, esq.

Ditto, for raising in Carolina, 18 l. remitted by Mr. John Watfon.

1759.

Silk Cocoons, for producing in Georgia, 87 l. 15 s. 11 d. to candidates.

1760.

Silk, for producing in Georgia, 136 l. 2 s. 9 d. $\frac{3}{4}$. to various candidates.

1761.

Silk Cocoons of the best kind, for producing in Georgia, 100 l. 13 s. 9 d. $\frac{1}{2}$. to various candidates.

Ditto, for an inferior kind, 65 l. 14 s. 8 d.

Myrtle Wax, for importing the greatest quantity, Mr. Perreneau, 30 l.

1762.

Myrtle Wax, for importing the greatest quantity, Mr. Anth. Bacon, 20 l.

1763.

Silk Cocoons of the best kind, for producing in Georgia, 188 l. 15 s. 4 d. to various candidates.

Ditto, for an inferior kind, 193 l. 7 s. 10 d.

For Care and Industry to promote in Virginia the purposes of this Society in the British colonies, Charles Carter, a gold medal.

Malleable Iron from the American black sand, for producing, Rev. Mr. Jared Eliott, a gold medal.

Pearl Ash, for establishing the manufacture of, in the colonies, Charles Dick, a gold medal.

1764.

Silk Cocoons, for producing in Georgia, 190 l. 1 s. 4 d. to various candidates.

1765.

1765.

Sturgeon, for importing from America the greatest quantity, Edm. Boeham, esq. 50 l.

Ditto, for the next greatest, Mess. Bourryau, 25 l.

Silk, in Connecticut, premiums paid by Jared Ingershall, 8 s. 9 d.

Pot-Ash made in America, for importing, 4 l. for each ton, to the following persons, viz.

Mess. Hughes and Whitlock, 100 l.

Mess. Barnard and Harrison, 80 l.

Mess. Lane and Booth, 216 l.

Mess. Lane and Booth, 89 l. 4 s.

Mr. John Crowley, 4 l.

1766.

Silk Cocoons, for producing in Georgia, 155 l. 13 s. 11 d. to various candidates.

Sturgeon, for importing from America the greatest quantity, Mr. Humph. Jackson, 50 l.

Pot-Ash made in America, for importing, 4 l. for each ton to the following persons, viz.

Mess. Champion and Haley, 10 l. 8 s. 6 d.

Mess. Menzies and Co. 7 l. 15 s.

Mess. Lane and Booth, 133 l. 15 s. 6 d.

Capt. Jacobson, 2 l. 11 s. 6 d.

Mr. Abraham Dupuis, 20 l. 14 s.

Mess. Hughes and Whitlock, 224 l. 5 s.

For his useful Observations in China, and industrious application of them in Georgia, Mr. Sam Bowen, of Georgia, a gold medal.

Pearl-Ash made in America, for importing, Sir Wm. Baker, 6 l. 2 s.

Silk Cocoons, for producing in Georgia, 254 l. 12 s. 6 d. to various candidates.

Pot-Ash, for effectually aiding to establish the manufacture of, in North America, Robert Dossie, esq. a gold medal presented.

Pot-Ash, for his method of assaying, William Lewis, M. B. F. R. S. a gold medal presented.

ARTICLE II.

An Account of all the Disbursements for Premiums, Bounties, Oeconomical Expences, &c. of the Society for the Encouragement of Arts, Manufactures, and Commerce, from its first Institution to the End of the Year 1766, with the total of the Receipts by Subscription, Legacies, &c.

	£.	s.	d.
RECEIVED, by Subscription, &c.	33,313	14	0
Polite Arts, — — — — —	6964	0	7
Agriculture, — — — — —	2202	10	10
Manufactures, — — — — —	1885	5	10½
Mechanics, — — — — —	2358	3	9
Chemistry, — — — — —	941	7	5
Colonies, — — — — —	2273	18	4½
Exhibitions, — — — — —	371	15	0
Rent, — — — — —	1477	1	6
Salaries and Allowances, — —	3847	9	7¼
Advertisements, — — — — —	854	19	6
Printing and Stationary, — —	1098	12	11
House Expences, — — — — —	592	2	11½
Furniture, — — — — —	761	14	5½
Repairs, — — — — —	897	4	5½
Contingent Expences, — — —	735	5	7
Land Carriage Fifth Plan, — —	3507	3	2
Total — — — — —	30768	16	0
Balance remaining, — — —	2544	18	0

ARTICLE III.

A brief History of the Transactions of The Society for the Encouragement of Arts, Manufactures, and Commerce, with Relation to the several Objects of Invention and Improvement, which they have adopted; and the respective Success of their Proceedings.

SECTION I.

INTRODUCTION.

THE plan of the Society for the Encouragement of Arts, Manufactures, and Commerce, was originally formed in the year 1753: and the first meeting was held

held at London, in March 1754. The Society consisted then only of a small number of noblemen and gentlemen, who met privately to concert regulations and measures for the future conduct of their design. But the assiduous zeal with which they applied themselves to establish and extend it; and the evident national advantages, that might accrue from such an institution; produced, soon after the plan was made public, a rapid increase of members; and rendered the Society, in a few years, a very considerable body.

It must be allowed, indeed, that as to the priority of time when this Society was founded, it is not the first of those which may be considered as of the same kind: nor has it, consequently, the claim of originality. But, for the extensiveness and importance of its views, the number and respectable character of its members, and the success of its undertakings, it has by much the pre-eminence over all others of a similar nature, which have been hitherto any where instituted; and possibly will maintain that pre-eminence, over any, that shall be, hereafter, established in the present age.

The dissipation, and great variety of other concerns, which engage, or rather distract, the attention of the multitude in London, prevent, nevertheless there, an adequate regard to the transactions of this Society, or their momentous consequences: and the disparaging misrepresentations of its proceedings, which caprice has prompted some persons to make, do not wholly fail of exciting prejudices. But the great encomiums given to it by foreigners; and their high consideration of it, shewn by constant applications, some of them from sovereign princes, and men of the highest reputation as to literature and science, for information and the liberty of correspondence: demonstrate that the effects of the Society's endeavours, where they meet with less disturbed and perverted observation, have raised the highest esteem both of their plan and conduct. This is moreover strongly confirmed by the frequently repeated acknowledgments and thanks of the British colonies in America, express by their principal inhabitants, governors, and even houses of assembly: who have given the fullest testimony of their sense of the benefits they have already shared, and hope yet to receive, from the Society's attempts to promote their interest. Perhaps, after all the eulogiums, or applause, that have been

been bestowed on the Society, the utmost which has been ascribed to the effects of their labours, either by those who view them in a nearer or more remote situation, falls short of the real advantages they have produced, as well to our own country, as to the world in general.

The only seeming defect and remissness in the conduct of this Society has lain, in neglecting to use some effectual means to render more universal a proper notion of the merit of their proceedings, by spreading a more distinct knowledge of those proceedings themselves; and to communicate more generally those acquisitions of invention and intelligence, which have been gained by the most industrious application, and liberal expence. It is hoped, however, the ground of this specious charge is now removed; and that an opportunity is obtained, of displaying for the future, in its full lustre, the good which the public receives from the labours of this beneficent body; the support of which ought to be earnestly promoted by every friend of the British community, or of mankind.

In this intention of leading the public to do justice to the pretensions of the Society, it were to be wished, that a complete detail, or history of its transactions had been published. But that has been found, in some measure, impracticable, in the way formerly proposed by the Society itself; and is now scarcely to be expected from any other quarter. A substitute for this work, comprehending the principal and essential part, is not, however, an impracticable undertaking; and may answer the end of it, both with respect to the public, and the æconomical interests of the Society. It is also necessary, for the elucidation of many articles which may demand a place in the contents of the following Memoirs, that what has been hitherto done by the Society with regard to them, should be previously understood. There can be no doubt but that a knowledge of the past facts, which have relation to the objects of the Society's encouragement now depending, as well as of the final views and reasons of proceeding, must be of utility in this light. And it may be productive of very beneficial consequences, that the principal of those others, where the Society has completed its design, and of course dismiss any further consideration of them, should be, in the same manner, enumerated and explained. Indeed, there is such a connection, in
many

many cases, betwixt the present and former subjects of the Society's consideration, that the one cannot be properly discussed without a retrospection to the other.

I have therefore, as a previous introduction to these Memoirs, endeavoured to make a fair sketch of the former proceedings of the Society, and their consequences, as far as regards the capital articles of encouragement they have taken in hand. But I shall neither enter into an æconomical history of the Society itself, nor even a chronological account of the transactions; as they comprize matters that would, necessarily be much too voluminous for, as well as foreign to, the present purpose.

In the early period of the Society, the smallness of the fund confined its regard to a few objects; though even among those some were very considerable as to their consequences. But the quick acquisition of members, and augmentation of subscription, soon enabled it to extend its views, and adopt a very comprehensive plan; in which not only the number, but the importance of the subjects of encouragement, became very great.

To speak with more distinctness and brevity of the particulars of these views, and the success attending the pursuit of them, it may be proper to divide the objects of them into FIVE CLASSES. These classes are not precisely the same with those formed by the Society in their premium book; which were founded very properly on the division of the business with relation to six separate committees: but they are better suited to a speculative and general consideration of the Society's proceedings. The objects of encouragement chosen by the Society, may, therefore be ranged under the distinction of *Polite Arts, Agriculture, Mechanical Arts, Chemical Arts, and Trade.*

S E C T. II.

Of Improvements in the Polite Arts.

BY POLITE ARTS, according to the sense in which the expression is used by the Society, are meant, those which depend on design and taste; and are called by others the FINE ARTS. As the contents of these Memoirs will have but little concern with this class, I shall wave entering into the consideration of any particulars of the Society's transactions relating to it, further than to observe, that they have had a most amazing success in their endeavours to promote the polite arts of every kind. Their *premiums* had first a very diffusive
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and powerful influence on the youth whose genius were turned to studies of this nature: and the incitement of emulation, arising thence, produced the most assiduous and spirited exertion of their talents. The introduction of the custom of *public exhibitions* of all works of taste, which was owing entirely to the example set by the Society, completed what the premiums had begun: extending its effects to the oldest and most able artists, as well as the young, it has advanced, in a few years, almost every branch of these arts, to such an approach toward perfection as was scarcely to be expected. At present, the operation of the premiums, for objects respecting the Polite Arts, is more confined than before this revolution in them; but they yet furnish great incitements to younger and less eminent artists; and afford them the means of displaying dawning genius, or an essay towards perfection, in such a manner as may introduce them more early and effectually to public notice, or private patronage; and, in this light, the Society's premiums may still be deemed a considerable means of encouragement to the Polite Arts in Great Britain.

There is one branch of the Polite Arts the Society have taken under their encouragement; which, though it depends on design, is of a mixt nature, as being of the greatest consequence to commerce. This is, the drawing patterns and designs for ornaments: for several branches of which the Society have offered premiums.

The great advantage the French have over us in this particular, both with respect to patterns for silk, paintings and ornaments for coaches, and designs for every kind of furniture which makes the upholsterers business, renders it a matter of very great moment to us, and highly worthy the attention of a body, whose views are the promoting the commerce of this country.

The Society, therefore, early offered premiums in a general way to the youth of both sexes, to encourage their application to the study of designs for weaving and ornaments: and, in 1766, they also offered a premium of fifty guineas for the best patterns for weavers, by persons of any age or sex. This has been since continued to the present: and many claims have been made for it. But hitherto only divided parts of the premium have been given: there having been nothing produced adequate to the views of the Society. Though some genius, and effort

effort towards improvement, have been displayed by some of the candidates. The Society have, also, this year offered a premium of fifty pounds for the best sett of drawings of ornaments for the use of upholsterers: which, if it have a due effect, will be of very great consequence to one of the most improving of our manufactures.

There was another article in the class of Polite Arts, for which the Society thought fit to offer some encouragement; that was, however, of a mixt nature as to the performance: having some dependance both on the Mechanical and Chemical Arts. It was, the *taking casts or impressions of intaglios or cameos in paste or glass of various colours*. The antients themselves practised this art in great perfection; and have left us many fine specimens of it. It had been revived in Italy; but was in general neglected here: though it is a means by which, the exquisite performances of the antients may be exhibited to more general observation and study, as well for the improvement of the invention and taste of artists, as for the gratification of others, who are admirers of excellence in works of design. Impressions of engravings of this kind, when perfectly executed, so much partake of the merit of the originals, that they may be considered, in fact, as multiplying them; and, consequently, being the means of dispersing them into a greater number of hands: and also, as of preventing many of those monuments of the antique taste, from being lost to the modern world: which may easily happen, by a variety of accidents in those cases, where there is only a single original, or a very few of each kind remaining.

The Society, therefore, in 1760, offered a premium of fifteen guineas for the producing the greatest number of such pastes, not less than thirty. This premium was continued to 1762; and then raised to twenty guineas for the greatest number, and ten for the next greatest; in which manner it was renewed the two succeeding years. The whole first premium was only twice obtained: and that by the same candidate; who, in 1762 and 1763, produced very ample collections of impressions, in glass, or vitreous compositions, of various colours, of antique figures, busts, &c. as well cameos as intaglios; some of them very fine in the original, and well taken off in the impression. In the year 1764, ten guineas, and five guineas, part of the first and second premiums, were likewise adjudged to two other candidates for sets of impressions inferior to the former.

The Society having thus, by an offer of their premiums for five years, done all that could be towards the inciting an attention to this matter, then discontinued them. But since that time, some other specimens were produced to the Society by an ingenious modeller : who has pushed this art to a much greater degree of perfection. He not only takes off the impressions of cameos and intaglios in a very perfect manner ; but he models portraits of living persons in small, even to the size of seals ; and takes exact impressions from these models. He has attained, also, to the art of using an opaque dark glass for the ground, and a white one for the relief, in making these impressions ; by which means, they are made to imitate, very closely, the antique cameos cut on laminated onyxes. It is hoped, this ingenious art will extend itself ; as it not only affords the means of making durable representations of living personages, of whom it may be wished to have the likeness preserved ; but may, also, furnish an elegant article of commerce, by producing, in the most cheap manner, either originals of persons of distinguished characters ; or copies of antient fine intaglios or cameos, that will greatly share the beauty of the originals.

S E C T. III.

Of the Improvements in Agriculture.

THE improvement of AGRICULTURE is ever a matter of the greatest consequence, as well to each particular country, as to mankind in general. It is peculiarly important to us, as a commercial nation : the support of our trade depending on our manufactures ; those manufactures on the rate of labour ; and the rate of labour, in a great degree, on the price of the necessaries of life. The Society, therefore, very early embraced it as one of the most considerable objects of their encouragement.

But, besides these general motives, which always subsist, for promoting Agriculture, others yet stronger have since occurred, from the political and natural accidents, that have rendered provisions of every kind distressfully scarce and dear with us. These circumstances have greatly added to the merits of the Society's endeavours for the public interest, in this point. It will greatly tend to counteract the growing causes of the dearness of provisions, that a fondness for farming and husbandry has spread itself among persons of property and liberal education : as it is they alone, who can give into the speculation of improvement ;
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and afford to make the requisite trials and experiments. The Society's proceedings are a principal cause of the diffusion of this taste: and, at the same time, they have excited the desire, they have pointed out, by the application of their premiums, the means of advancing the art of Agriculture in many branches: and of accommodating the practice to the public utility. The future advantages of this will be continually increasing; and cannot fail, as we may conclude from the quick progress we now see, to have the most beneficial consequences to our country; which, under the present circumstances, has a peculiar need of every assistance of this kind.

In the class of Agriculture, one of the first objects, on which the Society fixt its views, was *the encouragement of planting forest-trees for timber*: and, as the good proposed thence could only be gradually effected, they have, with great propriety, continued the premiums offered on this score to the present.

The reasons, which disposed the Society to institute the premiums for planting forest-trees, are very strong; and may be evidently deduced from the consideration of some clear facts. We are continually cutting down our woods and forests; sometimes at a due maturity; but more frequently much before: Indeed, as to those of a longer standing, if we were to spare them, the trees would soon decay; of which instances, to be much regretted, are to be seen in several of the royal forests. But the mischief is, that while we are constantly destroying the old timber plantations, we are not making any proportionable substitution of new, to provide for a due succession: whence this certain consequence must result from our present neglect in planting, that there will, in time, be a great scarcity, or rather a total want of timber, of the harder kinds, of our own production, though indispensibly necessary for ship-building, and many other purposes of the utmost consequence. A correspondent scarcity of wood for fuel, charcoal, poles, flakes, and other such uses, requisite for manufactures and agriculture, and now afforded by the branches and underwood, will likewise of course ensue; and must thence occasion manifold inconveniencies to the public. The cause of this remissness in renewing, or making plantations of forest-trees, takes its rise principally from one circumstance: which is, that the return of profit, according to the common management in making such

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plantations,

plantations, being so far distant, in consequence of the slow growth of timber, the original disbursement appears almost as so much property lost. Such undertakings are, therefore, suitable only to persons of great fortune, who can bear to sink so great a sum as is necessary for the carrying them into execution without inconvenience to their affairs; and to be content with the remote advantages that are to be reapt by their posterity.

In order, therefore, to incite, among such persons, a spirit to engage more warmly in the enterprize of planting, the Society offered their medals of gold and silver, as premiums for various kinds of timber-trees, under some proper conditions as to the number of trees and manner of planting. The reason, why the premiums were made of an honorary kind only in this case, is palpable, when we consider, it is only persons of fortune, on whom they were intended to operate. They have accordingly had a considerable effect: since noblemen, even of the highest rank, have been ambitious to gain them; and have made their claims for considerable plantations; as appears in the list of premiums prefixed to this history.

It is presumed, nevertheless, that the objection which arises, on account of the expence, to the planting trees, by those who cannot afford to let the money disbursed lye dead for a long term of years, will be, in a great measure, removed by the means pointed out in the observations, which will be given in these Memoirs, on the Society's premiums for planting particular kinds of trees; and by some other communications, that will be inserted with respect to the most advantageous methods of planting various kinds of timber-trees. As means will be there explained of conducting such plantations in a manner, by which, the capital employed will be soon regained; and a future profit acquired on the whole long before the timber-trees attain to their maturity; there is reason to hope, that this information will co-operate with the Society's premiums; and produce at length the whole of their desirable effect.

Another object also of the same nature was, some years ago, brought under the Society's consideration: but, from the multiplicity of other engagements of their time and attention, which then happened, the proceedings on it were deferred; and, from incidental reasons, have not been returned till the present year. This object is the encouragement

ment of *planting quick growing trees* ; such as the best kinds of willows, poplars, &c. that come to maturity in about thirty or forty years. A number of such plantations might supply the wood wanted for many purposes ; and, by keeping down, and lowering, the price of such as is wanted for these purposes, would take away the temptation, there now is, for destroying plantations of young oak trees, on account of the immediate great return they afford, instead of keeping them till they gain the full maturity of timber trees.

The cultivation of such quick growing trees may be performed in a manner that will yield a considerable profit in a few years ; and a very great additional and final one at the expiration of thirty or forty. The probability of inciting much greater numbers to undertake such plantations, than those of oak, or other timber trees of slower growth ; as well as the apparent utility of increasing the stock of wood of any kind ; have induced the Society to lend their attention to this matter, in which they may be of very essential service to the public.

Another of the first articles, that had some relation to agriculture, which the Society undertook to encourage, was the *Cultivation of Madder in England*. This may be considered as belonging to agriculture, from the kind and means of the produce : but it is of a double nature as to the intention. Since the advantages in a commercial light, which may be derived to the British community from the success of the attempt, are much more considerable than those which may be supposed to accrue to the planter in the light of a farmer.

The root of madder is a capital drug used in dying wool, linnen and cotton ; and indispensibly requisite in printing linnen and cotton : being the only red dye in general use for that purpose. It was, at the time when the Society first engaged in the encouragement of it, wholly imported from Holland : though it had formerly been a staple article of produce in our own country. We pay annually for this root to the Dutch an exceeding great sum ; not less, according to calculation, than near three hundred thousand pounds : and, what is still worse, taking the advantage of the necessity we are under to purchase it of them, they have not only advanced the price to an exorbitant rate ; but adulterate and sophisticate the madder in so bad a manner, as lays our manufactures, in which it is used, under the greatest difficulties. These manu-

factures, moreover, in which it is absolutely necessary, are of the utmost importance to us : particularly the printing linnen and cotton ; which furnishes employment to some thousands of our women and youth ; who would, otherwise, be waste hands ; and many of them burthen some to the public. Nothing, therefore, could be more worthy the regard of the Society, than the introduction of the culture of madder here ; which may tend to the national good so many different ways.

There was, however, at first, an almost insurmountable impediment to the culture of madder in England. It consisted in this circumstance, that madder being a crop raised on land, it was subject to pay tithe in kind : which was, in fact, so heavy a tax on the produce, as, together with the great expence and risk, from the want of a more perfect knowledge of the manner of cultivation, almost intirely discouraged all attempts in a larger way. This obstacle was, nevertheless, removed through the endeavours of the Society ; by the obtaining an act of parliament, to change the demand of tithe in kind, to a modus, or composition, of five shillings per acre, for a term of years. The Society thus, by their interposition in this matter, procured the first opening to that success, which is now likely to attend the attempts, to restore the production of this important article to our country.

The Society, in the mean time, exerted themselves to incite the attention and spirit to undertake the culture of madder by premiums. The first they offered was for the producing twenty pounds weight ; the most perfect, and best cured. This was obtained in the year 1755. They then, being by this means assured, that a method was known in England of raising and curing good madder, proposed premiums for the largest roots, twenty in number, of one, two, or three years growth : which were accordingly claimed and obtained for each kind, in the year 1758 ; and again in 1759.

They now proceeded to offer a premium of fifty pounds for the greatest number of acres, not less than ten, planted with madder and duly cultivated. This was accordingly claimed, and obtained in 1761.

The cultivation of madder having now made some progress, the Society, in 1762, appropriated five hundred pounds to be given at the rate of five pounds for every acre, provided that sum should be sufficient to afford it for all the claims : or otherwise, that the whole should be divided

vided among the candidates according to their respective number of acres. This premium was claimed, from 1763 to 1767 inclusive, with various quantities; but never to the amount of the whole premium offered: which, nevertheless, might have been reasonably hoped for so fair a prospect in the beginning; and such considerable encouragement.

In 1763, there were seventeen claims made, and now allowed to be just; which were in all for sixty-nine acres. In 1764, there were sixteen claims made and allowed; which were in all for forty-five acres. In 1765, there were fourteen claims made and allowed; which were in all for thirty-five acres. In 1766, there were fifteen claims made and allowed; which were in all for thirty-six acres. The report is not yet completed with respect to the claims for the year 1767; but the whole of them is considerably more than in the two preceding years. The total expence of the Society, from the first dispensation of premiums for the madder, to the year 1766 inclusive, has been 1111*l.* besides a medal. Of this, 188*l.* was given before the premium was offered for every acre. The other 923*l.* has been given for 185 acres; of which the greatest quantity that was ever claimed in one year, by the same person, was twenty-nine acres, in 1763; and the next greatest, fifteen acres, in 1764, and 1766.

The reasons why the cultivation of this plant, notwithstanding the noble efforts of the Society to establish it, did not increase, were various: and possibly a great part of them owing to erroneous notions, and a less perfect knowledge of the best method of culture.

The number of plants thought necessary, the Society requiring twenty thousand on each acre, was perhaps one discouragement; as it augmented the expence considerably: the plants being at first of the price of one guinea per thousand, and since half a guinea. But it is believed by very great judges, that half the number are sufficient; and, in the last premium, the Society have not directed any particular number of plants.

The very great depth of soil supposed to be necessary was another discouragement: as some imagined three or four feet depth was indispensable. Whereas good madder is raised on land, suitable in other respects, from sixteen inches to two feet.

The notion, that crops of madder impoverished and exhausted land on which it was cultivated, was, also, another difficulty which stood in the way of the increase of the culture of it. For the proprietors of proper land, which, according to the above-mentioned notion of great depth of soil, was only to be found in particular places, would not let it but on long leases. This greatly encumbered the planters of madder: who, after they had obtained two crops, had no longer any use for the land; and were obliged to let it again on disadvantageous terms. But such a caution in the proprietors of land was without foundation. For, though it was impaired after two crops, and considerably exhausted after three, with respect to the further production of madder, it was still no way injured by the crops of madder for the production of corn, or gramineous plants; which only derive their nutrition from the soil a little below the surface. On the contrary, if the land had been before worn out by crops of that kind, it would be improved by the culture of madder: which would produce the same effect as trench-plowing; of which the benefit is well known in soils of considerable depth.

These reasons, and the want of a more perfect knowledge of the profitable methods of cultivating and curing madder, together with the expences originally attending it, discouraged farmers, and persons concerned in common affairs of agriculture, from readily going into this matter, and prevented so quick a progress of it. But happily those quantities, which were, nevertheless, raised, occasioned a thorough conviction of the superiority of our madder to that brought from Holland: which, with the exorbitant price, as well as uncertainty of quality, of the Dutch, that had of course the operation of a premium, has determined many of the consumers of madder to turn their views to this important matter; and undertake themselves, to raise what they have occasion to use.

In consequence of this, it appears, that the claims made on the Society the last year for the premium, are much more numerous than in the preceding years: and, as the future premiums offered for this article are put on a much better footing than before; and measures are taken for procuring information of the best method of cultivating this plant, and preparing the root for the market, in order to assist those who might be otherwise deterred by finding difficulty in procuring such intelligence; it is not to be doubted,

doubted, but that the Society will, by this means, complete what they have so nobly begun.

There has, indeed, one very beneficial consequence already resulted from the steps that have been taken: which is, that the Dutch have been deterred by them from the raising the price of this commodity, so necessary to us, to a still greater height. For the States themselves, sensible of the strong reasons for keeping this article out of our hands, have checked, as far as they could, by the strictest prohibitions, the depraving it, when sent to our market, by adulteration.

Should the establishment of the production of this momentous article in our own country, be at length brought to bear, as there is now the greatest ground of hopes it will, the whole merit of this invaluable acquisition must be ascribed to the Society. They took the encouragement of it upon them, at a time when the former miscarriages of private persons had occasioned the pursuit of it to be wholly neglected, and laid aside; and they have continued to prosecute the design with the most assiduous attention, and an expence of more than eleven hundred pounds, besides the premiums of the last year, and five hundred pounds offered at present.

The next great object after madder, in the class of agriculture, to which the Society turned their attention, was the encouragement of *the production of BEES-WAX in England*. This article does not, strictly speaking, belong to agriculture: but, being a matter to be practised principally by farmers, and those who are concerned in husbandry, it was considered as belonging to that class. The large consumption of bees-wax for candles, which is a luxury daily increasing, affords just room for very serious consideration: as almost the whole of it we use, is purchased of foreigners by our money. The seeming possibility that we might ourselves produce a great part of what we use of this commodity, and save a very considerable national expence, gave rise to an intention in the Society, to endeavour, by premiums, and other means, to promote the increase of bees in our country.

They, accordingly, in the year 1761, offered a gold medal to the person who should erect, on or before the first day of September in the same year, the greatest number, not less than thirty, of hives or boxes stocked with bees: and, for the next greatest number, not less than
twenty,

twenty, a silver medal. They, at the same time, advertised the like premiums for the years 1762, and 1763. The gold medal was obtained in 1762 for two hundred and twenty-three stocks, and the silver one for one hundred and ten. And again by the same candidates in 1763.

In 1763, finding honorary rewards not to have the full effect desired, the Society added a pecuniary premium. This was eighty pounds, to be given to the person who should have in his possession, being his own property, on or before the first day of September, 1764, the greatest number of stocks of bees in hives, or boxes, not less than four hundred; to the next greatest number, not less than three hundred, fifty pounds; to the next, not less than two hundred, thirty pounds; and to the next, not less than one hundred, ten pounds. The gold medal was accordingly claimed in the year 1764, by the same candidate as obtained the two former, for one hundred and eighty-two stocks; and the silver medal by a new candidate, for one hundred and five stocks. The fourth pecuniary premium of ten pounds was also claimed for one hundred and fifty stocks. The higher premiums were not claimed: nor does it appear, in the Society's books, that any person had ever a greater number than that of the gentleman who obtained the three gold medals, whose greatest number of stocks, which was in the first year, amounted to two hundred and twenty-three.

In the year 1765, the Society offered a further pecuniary premium of five pounds, to every person who should have, on the first of February 1766, any number of stocks of bees, not less than thirty; provided the claims should not amount, in the whole, to more than two hundred pounds; in which case the sum of two hundred pounds was to be equally divided among the candidates.

To this last premium the Society joined, in the same year, another pecuniary premium, respecting the management of bees, which was thought expedient on the following principle. It was conceived, that one proper method of increasing the number of stocks, was to avoid the destruction of the bees when the wax was taken from them: which is almost constantly practised in the common method, where the bees are previously killed. In order to encourage the proposed change of conduct in this point, the Society pursued these means. They procured a model of an apparatus for taking away the honey commodiously without any injury to the bees; and they inserted in their advertisements, that any person desirous to treat bees
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in this manner might see this apparatus in the Society's office. The premium they offered, on this account, was five pounds to every person, who, within the year 1767, should collect from stocks of bees, of his own property, ten pounds of clean merchantable wax, without destroying the bees, leaving a sufficient quantity of honey for their winter sustenance; but, in case the whole of the claims should amount to more than two hundred pounds, then that sum to be divided among the candidates.

The claims made and allowed, for the premiums for having above thirty stocks of bees, were by twenty-one persons: the number of whose stocks taken together amounted only to nine hundred and nine. This seems to evince, incontestably, that the production of wax is greatly neglected in England, either from some difficulty, or uncertainty, that discourages the pursuit; or from want of adequate profit in a country, where the great circulation of money makes objects, that are of small consequence with respect to particulars, be too much disregarded.

The time of the claims for the preserving the bees is also now expired: and the effect of the premiums appears to be very inconsiderable. There were only six candidates: who, all together, produced only sixty-eight pounds and a half of wax. But it is an undecided question, whether the destroying, or saving, the bees be the most advantageous method. An opinion prevails amongst those, who are acquainted with the natural history of bees, that, like other species of flies, they are in a great measure of an annual existence: and that part die the first year; and the others are, after that time, weak, and unprofitable, compared to fresh stocks. Moreover, when the bees are not destroyed, the advantage of the honey, which makes the greatest part of the present profit of keeping bees, must be given up in a considerable degree. It was, however, a matter not unworthy examination: and the Society's premium were the most effectual means to obtain any ground for a decision of this question.

The production of wax in our own country is certainly a great national concern, if it could be effected: and the public are obliged to the Society for this spirited attempt, whatever may be the result of it: as they appear to have taken great pains in the consideration of the mode of their premiums; and have appropriated very liberal sums to them. But they have, with very just reason, now dis-
continued

continued their premiums for this article : as they were found to be very ineffectual. Since, by the offer of two hundred pounds in one premium, besides the others which were concurrent with it : and the actual expence of one hundred and five pounds given last year, to the claims for that premium ; they did not procure at the most, above twelve or thirteen hundred pounds weight of wax : which cannot be valued to the public at more than sixty-five or seventy pounds sterling. This is evident in the following calculation. Let the quantity of wax be rated, one stock with another, at one pound and a half for each stock. This is the most which can be allowed : because five of the candidates, who took the wax without killing the bees, appear, from their certificates, to have obtained in the whole only fifty-seven pounds and a half of wax, from fifty-seven stocks of bees, which is only one pound and the fifty-seventh part of a pound from each stock. So that allowing a pound and a half to each, is much more than is warranted from the product of the fifty-seven stocks. The price of wax imported cannot be rated at above a shilling a pound : but, to give the question the utmost fair play, we will take that to be the rate. The claims on the Society were, for nine hundred and nine stocks ; which, according to these premises, we will suppose to have produced each one pound and a half, worth one shilling per pound. Therefore the nine hundred and nine stocks produced thirteen hundred and sixty-three pounds and a half of wax, worth sixty-eight pounds, three shillings, and six-pence. As we may presume that the greatest part of those who were intitled to this premium, by having above thirty stocks of bees, claimed it of the Society, we may hence infer, the very small quantity of wax produced in England. For there are single apiaries in Germany that consist of four times the number of all the claims ; and, if we make the largest allowance for the single stocks, or for the number that may be together, under thirty, we shall find the whole must be very trifling. It must be remarked also, that the honey, for the quantity of which that is now produced, there is such a demand as keeps it at a moderate price, is the principal return to those who keep bees. But if the quantity of it produced were ten times as great, which would not yet render the quantity of wax a considerable national object, this encouragement would be taken away. For there being no use or demand for such a quantity

tity of honey, the price of it would of course fall extremely low. So the production of wax may well be deemed an hopeless object of public encouragement in our country, during its present state.

The extending *the Culture of HEMP in Eng^d* was considered, also, by the Society, as a capital object of encouragement in the class of Agriculture. There are two reasons which make the production of this article, in our own dominions, a matter of very high importance. The one is, that we pay very great sums for hemp to foreign countries where the balance of trade lies against us. The other is, that besides its being some way or other useful in almost every manufacture, and considerable work, it is an indispensable material for sails and cordage, in the construction, as well of ships of war, as trading vessels; and, therefore, so absolutely requisite both for our defence and trade, that we ought to neglect no method of avoiding this dependance on means of supply which are so precarious, as the purchasing and importing it from other countries. A means to which, it is possible, the greatest difficulties may be thrown in the way, by the contrivance of artful enemies, at some critical period.

The Society, induced by these motives, as we shall see below, first begun to attempt the removing this deficiency in our commercial system, by offering premiums for the production of hemp in the colonies. But, as the progress of the culture of hemp there, must be gradual; and we cannot expect them soon even to provide for their own consumption, much less for ours; it was proposed also, to offer other premiums for the encouragement of the production of this article in England, in order to revive the attention to it which appeared to be declining.

Accordingly, in 1761, seven hundred pounds were allotted for the whole of the intended premiums: and divided into seven parts, to be dispersed in seven divisions of the counties in England, on these conditions: To the person in each division, who, in 1762, should sow with hemp the greatest quantity of land not less than twenty acres, plucking the summer crop, and leaving the seed crop on the ground till the seed be ripe, forty pounds: to the second greatest quantity, not less than fifteen acres, thirty pounds: to the third greatest quantity, not less than ten acres, twenty pounds: and to the fourth greatest quantity,

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not less than five acres, ten pounds. These premiums were renewed for three succeeding years.

In 1762 the claims made and allowed were for 66, 15, 14, and 12 acres, and some fractions of acres, by four candidates. In 1763 the claims made, and now allowed just, were for 43, 35, 31, and 19 acres, and some fractions of acres, by four candidates. In 1764 the claims made, and allowed, were for 37, 29, 18, 15, 15 and 10 acres, and some fractions of acres, by five candidates.

The whole of the candidates, which claimed these several premiums, were only seven in number: some of the same candidates claiming for more than one year.

It appears from hence, that the whole claims in the first year were for 107 acres: those in the second for 128 acres: and those in the third for 124 acres: that the greatest quantity cultivated by any one person was 66 acres: that the whole of the quantities in each year did not vary in any significant degree: that the whole quantity which claimed was inconsiderable, in the light of a national object: and that the number of acres claimed for in the last year, was less by four than in the preceding year.

These premises clearly evince, that the Society's premiums produced no material effect: and, therefore, after so fair a trial, they very properly discontinued them. The reason, why the culture of hemp is more neglected now than formerly, is such as is not to be counteracted by means of that kind. It evidently consists only in this, that since the advance of the rate of labour, and the price of manure, the farmer can employ his land and stock more profitably, for the most part in the culture of corn, or other articles, than of hemp: and, indeed, it may admit of some doubt, whether a great increase of the quantity of hemp cultivated, would not be rather a detriment than an advantage to the public: as it would, in proportion, lessen the quantity of provisions produced; the dearth of which is the greatest æconomical evil that attends us at present.

There are, however, some circumstances in which the cultivation of hemp, in a certain proportion, may be very beneficial, as well to the farmer as the public. When any person concerned both in tillage and pasture has, in consequence of holding very good land, such a quantity of manure, that, without disadvantage to his other undertakings, he can spare a part of it; and has also the command of hands on cheap terms, at a proper time of the year, for
curing

curing and dressing the hemp; he may cultivate a suitable quantity of it with due advantage. Other farmers, also, who have hands in their families, or service, that are devoid of employment in winter, may, with profit, cultivate just so much hemp, as will find work for them, in the dressing, or manufacturing, of it: since the return for such work makes ample amends for any disadvantage in the culture, compared to that of other articles. But, these; or the occupation of land, peculiarly suited to the production of hemp, by the nature of the soil, or plenty of some proper kind of manure in the neighbourhood, joined to the opportunity of obtaining the assistance of cheap labour; are the only cases where the culture of it can be advantageous, either to the public, or the undertakers.

The truth of what is here advanced appears, indeed, from the small number of claimants of the Society's premiums: since it is thence evident, the far greatest part of the hemp, which is now cultivated in England, is raised in little quantities, as here proposed. For, though the least premium demanded no more than five acres, there were only seven persons, who brought claims, in the whole three years the premiums were continued. People who are concerned in any undertakings of business, naturally adopt what they find is profitable, and shun what is disadvantageous, as far as they understand it. It is no wonder, therefore, that producing larger quantities of hemp is attempted only in few places: but the culture of it even under those circumstances where it might be more generally beneficial, is confined also to particular parts, though it would be suitable to many others. The reason arises merely from the want of knowledge of the profit that might accrue; or of examples of some to incite others. This deficiency would be best removed by the encouragement of gentlemen to their tenants, to introduce the practice of cultivating as much hemp as would occupy the waste time of hands in their families: which would enable them to pay their rent; and contribute to the habit of industry in the individuals of the families. As the defect of knowledge of the proper methods of cultivating, and dressing hemp, is, therefore, one great cause, in many places, of the neglect of it; the supplying such knowledge is of course a more efficacious means of promoting the extension of this article in the right way, than any premium could possibly be. It is, at present, under the consideration of the Society

soils ; and the sweetness of their taste, shewing they contain more saccharine juice than carrots, there can be no doubt of their being more nutritive to such beasts, as they would well agree with. They promise to be particularly serviceable in feeding hogs.

The premium for PARSLEY has been also discontinued by the Society for the same reason, as that for the parsneps ; viz. to make room for articles that may be more readily attended to than these appear to have been.

This pursuit of the general improvement of pasturage led to another more particular, but very important speculation. It was, *the discovering a WINTER PABULUM (as it was called by the gentlemen who set on foot this matter) for CATTLE* ; or, in other words, some plant or plants of which the herb or root would afford a profitable crop, and stand till the middle of the spring, in spite of the severest frost, so as to be a certain dependance when the stock of hay, or other dry food, should fail. The observation, that the present greatest defect in pasturage lay, in not having any kind of herb or root, in common culture, that would fully answer this end ; and the probability of finding out some such ; were the grounds of this undertaking. It is obvious, that the greatest distress we suffer in the temporary scarcity, and high rise of price of provisions, is principally owing to this circumstance. In seasons when the crops of hay fall very short, and succeeding long frosts lock out the aid of green herbage or roots, the farmers and graziers are obliged to kill off a great part of their stock cattle, for want of the means of providing food for them. This injury to their stock, cannot be repaired by a proper recruit under a long time : and, consequently, in the succeeding years there will be a deficiency of the number of cattle brought to market. The procuring, therefore, some preventive means against these very detrimental consequences of an impropitious season, is a matter of the greatest advantage, as well to the public, as the grazier or farmer. The use of turneps has been, a considerable time ago, introduced for this end : and some maintain, that it is sufficient to answer the purpose. But whoever considers how uncertain the producing a good crop of turneps is, on account of the fly, and other accidents ; and how liable they are to be destroyed by great wet, and yet more by long and hard frosts, the very circumstance under which the great want of them occurs ; must be convinced of the

error of such an assertion, by the most evident reasons. Indeed the very fact proves itself. For we have lately suffered greatly on this account, notwithstanding the use of turneps.

The Society, urged by these very just motives, took the utmost pains in this matter; and employed all the means, that could be devised, to gain information of whatever could lead to the discovery of a preventive remedy for this evil. Their secretary was directed to write to the persons distinguished for knowledge in matters of this kind, in every part of Europe; to enquire what was the practice in their respective countries as to this point; and to beg, also, their private opinion regarding it. Answers were duly returned from them: but without supplying such lights as might have been hoped for. The sentiments, likewise, of the most able persons at home were given on this subject: and the turnep cabbage, brocole, white Chinese vetch, Siberian medicago, furze, and some others, were recommended, as plants that would answer this end.

Among the rest of the herbs proposed as fit for this purpose, Mr. Roque, a gardener, offered BURNET, as being peculiarly suited to this use from its copious product, early growth in the spring, great hardiness, and the retention of its living shoots, and even vegetation, in winter. The Society were prevailed upon by the appearance of specimens, examined at different seasons of the year, to believe there was a prospect, this plant might prove in a great measure, what they sought for, as a winter pabulum for cattle: and in order that due trials might be made, they offered premiums for the cultivation of it. These premiums had the desired effect. For claims were made for many parcels, some not less than thirty or forty acres, by gentlemen who gave very favourable accounts of the plant; particularly of its hardiness and use in frosts; and of its nutritive quality, evinced by the quantity and richness of the milk of cows fed with it, even in the midst of winter. A division of opinion, nevertheless, prevails amongst those who have most cultivated this plant, as to its comparative utility with others cultivated for the same purposes. But it is certain, from letters received by the secretary to the Society, that the cultivation of this plant is extending itself greatly, both in several counties of England and in Germany, gaining considerable esteem, particularly in some parts of Lincolnshire and Suffolk. Among other

good qualities attributed to it, there is a prevailing notion in some places where it is now much cultivated, that it is both a preventive and curative remedy for rot in sheep. Should this prove true in fact, the culture of burnet would be a most valuable acquisition to agriculture: but I speak of it only on the authority of the contents of the letters, I have just now mentioned. The Society have, however, now left it to future observations and trials, to determine the merits of this plant, cultivated on good land. Having procured a sufficient train of general experiments, by the continuance of their premiums for several years, they have now changed the mode of them; and made them depend on planting the greatest number of acres, the land being the worst reputed ground in the neighbourhood. They were induced to offer premiums, for the cultivation of *Burnet*, on this condition, by several representations, that crops of it had been obtained on very bad land: the ascertaining which point was certainly a very material object. For it would doubtless be a matter of considerable utility to know, that a good crop of any herbage, that was an agreeable and nutritive food for cattle, and durable for several years, could be raised with a small expence on bad ground: especially being of such a kind as will stand the winter, and be a certain resource in severe seasons. However this may prove, one fault must be admitted in burnet: which is, that in some particular places or soils, it is so disagreeable, both to sheep, horses, and other cattle, that they will not be inticed, by any means, to make it their food; but will rather starve than taste it. It is proper, therefore, to be well informed of this, by trials of small quantities in every fresh place where burnet is to be cultivated, before large undertakings be entered on: otherwise a considerable loss may accrue on this principle.

The Society have, also, more lately proposed premiums for two kinds of plants, before mentioned, of the cabbage tribe, the *Turnep Cabbage* and the *Borecole*. They were partly determined to this by the accounts of Mr. Wynne Baker's experiments in Ireland, published in his report to the Dublin Society for the year 1765, and inserted in the *Museum Rusticum*, Vol. V. The prospect of borecole's answering the ends of a winter pabulum for cattle seems greater, in some respects, than that of burnet: as its produce is well known to be a profitable crop; and it is never liable to be destroyed by keen frost or rain. But the durability

rability of burnet is, it must be admitted, a circumstance of great weight in the computation. The turnep cabbage and borecole have the same advantage over turneps: and another over them, and all roots or trailing herbs, that lye on the ground; which is, that being erect they can be eaten by, or cut for the use of cattle, though the ground be covered with snow of a moderate depth.

The premium for the turnep cabbage was claimed, last year, by a gentleman, who gave the most promising relation of its use and value. He has, also, obtained the same premium again the present year; and confirmed in the last account what he had said of the utility of this plant in his former. Both these accounts will be found below in these Memoirs. But there were some instances last winter of this plant's suffering by the frost.

The premium for *Borecole* was offered since that for the turnep-cabbage: and no claim has been hitherto made for it; probably from the little acquaintance of the public with this plant, and the difficulty of procuring the seed, at least such as can be depended upon. But an account will be found below of the nature, cultivation, and use of it: and Mr. Shields, nursery-man, at Lambeth, in Surry, having undertaken to the Society, to supply, in a perfect state, all such plants, roots, cuttings, or seeds, of such articles as they shall offer, or have offered premiums for; it is not doubted but that this plant will, as well as the turnep cabbage, meet with a fair trial; and prove very beneficial, under many circumstances, as a winter or spring food for neat cattle and sheep. As borecole may be depended upon, as a resource, in the most rigorous seasons, when almost all other herbage is destroyed or buried in snow.

There is another plant of the cabbage kind, called the **COLESEED**, which is very hardy; and is now cultivated in some parts of several counties for the purposes of feeding cattle and sheep in winter. The Society has endeavoured to procure, by the offer of premiums this year, information of the best manner of culture, and the expence, produce, and use, of this plant, that a comparison may be made of it with the turnep-cabbage and borecole, in order to determine which has the general superiority, or in what particulars one may be preferable to the other. A more detail explanation of the nature, and culture of this plant, will be below given in the observations on the Society's premiums now offered.

The procuring *the separate Collection, and Cultivation of the most valuable kinds of ENGLISH GRASSES*, was another very important view with relation to agriculture, which the Society entered into : and their endeavours with regard to it, have been attended with such success, as has fully answered the ends proposed. The merit of the Society with respect to the good produced by it to the public, is less conspicuous to the world in general than some other points, though not less real. The reason of this is, that the subject, though very momentous, is more obscure. Because, in order to judge of the very great advantages, that may hereafter be reaped from this matter, it requires a previous consideration of some particulars, which do not occur common and superficial observation : though they may be easily comprehended, when presented in a clear light, and duly attended to.

It is well known, that some kinds of grasses are more suitable than others to particular soils : and it is equally so, that some are fitter than others for particular purposes. It is certain, also, that the various kinds of grasses differ, even some months, in their earlier or later vegetation, and arrival at maturity : and, consequently, that some are in the most perfect state for making hay long before others. It is equally true, likewise, that grass seeds of any particular kind sown free from the seeds of weeds, and in a copious quantity on a soil favourable to them, will rise with very few weeds : and those few will be mostly of a rank and strong kind, that shew themselves above the grass ; and may be extirpated before they again produce seed : the smaller and weaker weeds being, in this case, overcome by the quantity and luxuriance of the grass itself. These circumstances evidently indicate, that in order to have a pasture, when fresh laid down, soon full of good and durable grass, free from weeds, it should be sown with grass seeds of the particular kinds, which will best suit with the soil ; and have no mixture of the seeds of weeds with them. The same holds equally good as to the replenishing older pastures with fresh grass by means of seed : which if bad, will fail of its effect ; and if mixt with the seeds of weeds, will of course fill the pasture with them. It is also a clear inference from obvious facts, that, where a particular species of grass is wanted, for any required purpose, free from all the other kinds, such grass must be raised by cultivation ;

tion ; except when it abounds greatly in the place, where there is occasion for it : which rarely happens.

But, notwithstanding these palpable reasons for attention and care, as to the choice of grafs seeds to be sown, the universal practice has been hitherto diametrically opposite to these principles : and a total neglect of regard to every one of them has prevailed.

When grafs seeds are wanted either to lay down pastures, or recruit them with fresh grafs, they are always taken from the sheddings of the hay in the loft or stack : and generally without any regard to the place whence the hay was obtained, the maturity or other qualities of the seed itself, or the commixture of that of weeds with it. Hence, from the uncertainty of the fitness of the grafs, this seed will produce, to the nature of the soil, where it is sown ; as well as of the real quantity of fertile seed, from the varying maturity of the grafs whence the hay was made, and from the mixture of weeds frequently the most noxious ; a very great uncertainty arises of the crop of grafs produced ; together with the chance of having it accompanied with the most troublesome weeds : many times, such as were strangers to the place before they were thus introduced ; and are scarcely to be eradicated, but with the destruction of the grafs itself. By this slovenly method of management, many pastures are always in an ill condition ; and most others require a long time after they are laid down, before they be well covered with good grafs : whereas, if they were sown with a quantity of proper clean grafs seeds, they would not fail immediately to produce full crops of the best grafs.

But it was impracticable to reform the old method with respect to the sowing grafs, however wrong, till means were provided for obtaining the proper kinds of seeds separately, in order that they might be used in the place of the mixt seed. This could only be done, at first, by gathering with the hand : and, considering the scarcity of some kinds, necessarily required great trouble or expence. This matter was, therefore, never likely to be performed by private individuals, in a way effectual to the service of the public : and the Society on that account took it upon them.

They pursued their intention of rectifying this ill management in the use of grafs seeds, in two views. The one, by an attempt to procure perfect seed, with the mix-

ture of kinds, as they are found in the fields cultivated in the common manner. The other, to try to procure the reparate collection of the seed of each of the best kinds of grafs, in order to their being cultivated separately, or in designed mixtures.

To prosecute the first of these views, they offered, in the year 1763, *to the person who should grow, and produce to the Society, the greatest quantity of the cleanest hay seeds, threshed from hay, that has stood till ripe, (not less than ten sacks) twenty pounds: and for the next greatest quantity, not less than five sacks, ten pounds.* This was never claimed.

The other view, respecting an object of a more novel and complex nature, they pursued by means of a succession of different premiums. In their first advertisement, they declared, that there were eight or ten species of English grasses greatly preferable to all others; and offered, as premiums, the sum of five pounds to the person, who should produce the greatest quantity, not less than ten pounds weight of seed, of each species, gathered by the hand and kept separate. The Society declared, also, in these advertisements, that they *did not think proper to specify the names of the grasses they required: as such grasses have various names in different parts of the kingdom: but they reserved the right of excluding all such as should not be really valuable and useful.*

It was certainly a right measure, to avoid, at that time, mentioning the particular species of the grasses in the advertisements; but to leave those, who collected them, to consult farmers, or other persons of experience, or knowledge; if they themselves had not sufficient intelligence in these matters. For, by this means, the Society had an opportunity of knowing the sentiments of the people, who should become claimants, with respect to the reputation and value of the several kinds of the grasses: at the same time, they avoided the difficulty and confusion, which would then have happened from the introducing new names.

It may be proper to observe here, that the words *English grasses* were used in the Society's advertisements, to prevent the mistakes that might happen, had the word *grass* alone been used, from the people's imagining, that the plants called foreign grasses, such as the clovers, saintfoin, or lucern, &c. were included, if not solely meant: though these

these being before collected separately, and sown alone, or mixt according to some intention, could not come within the design of the premiums. These plants, called foreign grasses, are not, in fact, of the grass genus: but are called grasses only from their being applied to the same uses. There is, indeed, one species of the true grass, that was before collected, and sown with the foreign grasses, which is the kind called rye-grass, or by some ray grass: but the Society took care to except it specially in their advertisements. The known utility of these foreign grasses, and of rye-grass in forming pastures, by being sown separately, or in adapted mixtures, carries a strong suggestion of the expedience of doing the same with all good English or true grasses, when the seed can be easily obtained separately: since the same advantages would attend the practice of this method with respect to them, when their nature and properties were once so well known, that they could be accommodated to each purpose.

In consequence of the offer of these premiums, claims were made for several of the seeds of the best kinds of grasses, which could be most easily collected: and an attention was excited in many, who were fond of improvements in agriculture, to this promising means of the improvement of pasturage. But it appearing now, on a more minute and better grounded observation, which these claims occasioned, that one or two of the other kinds of grasses were not to be collected without great trouble, in such quantities as the Society required, from the plants accidentally found, an alteration was made in the advertisement of the year 1765. In the conditions of the premium then proposed, the limitation of the least quantity of seeds of each kind to be collected, was reduced from ten pounds weight to one pound: and the sum of five pounds was continued as the premium. The Society also specified now the kinds of grasses, of which the seeds were to be admitted to the claim: and they were; *the vernal—fine bent—meadow fox-tail—sheeps fescue—crested dogs-tail—and common poa*. In order that these names might be understood by the candidates, the Society, in the advertisement, referred them to specimens of the grass in seed, to be seen at their Office, and to the prints of them in Mr. *Stillingfleet's Miscellaneous Tracts*; and in Mr. *Mills's Husbandry*.

A gold medal was also offered to any nobleman, or gentleman, who should cause to be collected by hand, the
greatest

greatest quantity, not less than two pounds weight, of the *meadow fescue*, *yellow oat*, and *annual poa*, in the year 1765 : and should sow in drills, the greatest quantity of land, not less than one acre, in the year 1767, with any of the kinds.

In the year 1766, the Society again changed their advertisement, and offered, *for the greatest quantities, respectively, of each of the abovementioned kinds of grass seed, gathered clean from the fields, by hand, when ripe, in the year 1766, or produced, and clean saved, from such seeds, gathered in the year 1765, as shall be separately sown in drills, and kept clean from all mixtures of other grasses or weeds, ten pounds.* And presuming rightly, as the event has since proved, that the last mentioned premium would procure the collection of such a sufficient quantity of most of the enumerated grasses, as would enable some persons to cultivate them so as to produce large quantities of the seeds, they super-added some other premiums for the year 1767 : considering the whole as a conclusive or final set, that would complete the whole of the Society's views. These premiums were twenty pounds for the greatest quantity of land, not less than one acre, sown in drills, with each of the abovementioned kinds of grass seed, unmixed with any other kind, in the year 1767.

By the event of these premiums, which have been claimed for two acres of one of the kinds, and one acre for each of the six other kinds of the grass seeds, there is now a sufficient stock produced for the use of the public : nor is there wanting an equivalent number of the promoters of husbandry, who are ready to employ it for various purposes, and trials. The Society have therefore now discontinued their premiums for grass seed : except the offering one for the sowing the greatest quantity of land, this year, with the *vernal grass* seed ; for the sowing which, in 1767, no claim was made. And this may be considered as the completion of their very laudable undertaking, carried on by the most judicious means, and at a very liberal expence, as well to procure the separate collection of the several kinds of the grass seeds, as to diffuse a general notion of the utility of them. In consequence of their proceedings, there is now furnished the means of reforming the crude and disadvantageous practice of sowing the promiscuous seeds of the hay-loft ; as well as of making experiments in large, of the comparative value or fitness for particular purposes, of the several

veral kinds of grasses, or their commixtures with each other ; and of distinguishing the soil to which each may be most suitable, or ascertaining the most profitable management and application of them. The consequences of this pursuit must necessarily be attended with very considerable improvements in pasturage : which, as has been above observed, is at present a concern of the greatest moment to the welfare of Great-Britain. Whoever, desiring to prosecute this matter, may wish to be more minutely informed respecting it, may consult the last edition of the ingenious Mr. *Stillingfleet's Tracts* ; or an excellent letter on this subject, signed *Philo-gramen*, published in the *Museum Rusticum*, vol. V. by a gentleman who has been the principal instrument in the Society's undertaking and completing this important affair. It may be proper to mention that the several grass-seeds, raised separately, in drills, on the acres, for which the last premiums were given, are now in a fine condition ; and will consequently produce such a quantity of seed as may supply numbers of gentlemen, who are desirous to push this noble inquiry to its full extent.

The next pursuit in which the Society engaged for the promoting agriculture, was the endeavouring to procure the information and trials requisite to the deciding the important question, respecting the comparative utility and advantages of the DRILL, and BROAD-CAST husbandry.

The former, and indeed, yet almost general method of cultivating corn, turneps, pulse, clover, the foreign grasses, and most other field plants, that are not transplanted, is by sowing them with the hand at large : in which method, they are spread over the whole surface of the ground ; and, thence, said to be sown in BROAD-CAST. This is the most simple method ; and requiring the ground, in general, only to be ploughed once or twice, and harrowed at the proper season, occasions the least original expence in the preparation. But, in this method, manure and fallowing, or both, are necessary at short periods : and a number of successive crops of wheat, or other of the most profitable articles, are not to be had from it.

The *drill husbandry* has, hitherto, prevailed but lately and partially. It consists, in breaking the ground, by repeated ploughing, and harrowings, till it be fine : and then

then sowing the seed in drills, or rows, with such intervals betwixt each, as will admit of the ground's being cut and stirred with a hoeing plough, drawn by a horse. In this method, it is, also, practised to sow the corn, or other seed, by means of a compound machine, called, from this use, a *drill plough*: which makes several seed furrows, deposits the seed, and covers it properly with earth, all at one operation. It is not, however, till very lately, that any complete machine of this kind has been invented: and, therefore, the Society offered, for several years, a premium of fifty pounds for the producing one, that was so well constructed as to answer the end. They have two, for which premiums were given, in their repository of machines subservient to agriculture. But there are one or two others of a more improved construction, that will, also, soon be in their possession; and are more simple, cheap, and effectual for the purpose. An accurate description of the use and merits of these ploughs will be below inserted among the following Memoirs.

It is not pertinent to the subject here, to enter into the dispute, where and by whom the method of drill culture was first invented: but it is an unquestionable truth, that Mr. Tull, who wrote largely on this kind of husbandry, was the first who introduced the use of it into our country. He, nevertheless, only started the notion. The practice was very little pursued till the Society awakened the public attention to it by their premiums.

The principle, on which the advantage of the drill culture is founded, lyes in the breaking the soil into fine parts, and exposing it to the air in this state: which becomes practicable, by means of proper machines of the plough or other kinds, when all the plants grow in rows, and at sufficient distances. In Mr. Tull's method, this was done by alternate fallow and crop in the spaces or intervals. But more advantageous methods have been since practised. This breaking the soil, and exposing it to the operation of the air, is found to fertilize it: and Mr. Tull seeing the fact to be so, adopted a mistaken theory, that fertilization consisted principally or solely in breaking the earth into fine parts, in order they might be the better fitted to enter the nutrient vessels of the plants. It would be easy to show nevertheless, that reducing the earth into small parts is only one means of fertilization, among

among many others; and not even a constant one in every circumstance: that the fitting earth to enter plants by mechanical action, is entirely an error; as it never does enter plants at all in a solid and undissolved state: and that when earth is in the most pulverised and incohering state, it is least fertile or capable of supporting plants. The fact is, however, certain, though for different reasons, that stiff and cohering earth, broken and exposed to the air, does gain a considerable degree of fertility: and is capable of yielding copious crops of some kinds of vegetables, it would not otherwise bear. It was natural enough for Mr. Tull, who was not much acquainted with the principles of chemistry, or the facts of natural history, to fall into this erroneous notion: and it should not take off from his merit, of having made a noble effort to the improvement of husbandry; the effects of which, when this method has undergone due improvements. will prove of the greatest benefit to our country; and indeed to mankind in general.

The manner of practice of this kind of husbandry, as taught by Mr. Tull, was in several particulars erroneous, as might well be expected in a first essay, or, as was the case in most points, from untried notions: and, to the adhering too closely to it, is owing, in a great degree, the slow introduction, and the doubt of the general utility of the method itself. The intervals betwixt the rows of the plants, as recommended by Mr. Tull, were too great, perhaps double what they should be in the most profitable method of culture: by which means much less crops are obtained than might be produced at nearly the same expence. This has rendered the profits of the drill method much less than they would have been in on a more judicious practice: and, consequently, been a great disadvantage to it, in the comparison with the broad-cast. Mr. Tull was led into this, partly from the want of more perfect instruments for hoeing: these of which the construction was then invented, being clumsy, and difficult to manage. The ploughs for drilling were more imperfect still than them: and this defect of instruments has been another principal cause of the slow progress of this improvement.

The practical advantages proposed from the drill method of culture are the following: The saving the loss of land, incurred by laying it fallow at short periods;

or

or the expence of frequent and large manuring; which are necessary in the broad-cast: the destroying weeds, by the opportunity afforded of hoeing the intervals, either by the hand or horses: the increasing the fertility of the soil, by thus stirring and breaking the ground, so that each crop may be greater than in the broad-cast way: the being able to earth the plants, or, in other words, to throw up the soil on the crown of the root, by which some kinds are rendered more vigorous, and preserved from the effect of the injury of frosts: and the giving air to some species of plants, which will bear only towards the tops, where they are crowded, as in the broad-cast manner of culture. These are the benefits supposed to arise to the farmer, by this way of culture. Those which the public would receive from the general practice of it, would be very great: as it substitutes labour in the place of fallow and manure; by which a considerable addition would be made to the national stock of provisions procured. If manure were thus spared from the land on which corn, turneps, &c. were raised, it might then be employed on the poorer grass lands: by which means, the crops in the inferior kinds of pasture would be much increased; and the whole produce of hay and grass necessarily augmented. The proportion of labour in husbandry, also, being thus increased, more hands would be occupied in it: whence population would be advanced in the most beneficial manner to the public interest. For the stock of provisions being augmented, on the whole, in a much greater proportion, by this change of culture, than the number of people, the consumption arising from the increase of number would not raise the price of them. Whereas, in our present state, the multiplying the number of people employed in manufactures would tend to make provisions dearer in a great proportion: and thus, rendering the general price of labour higher, would prove a *felo de se*, by giving foreigners an opportunity to underwork, and consequently, undersell us at the markets of our exports: as we have already experienced in the loss of several of the most capital articles of our commerce. Our danger in this point is, moreover, every day growing more formidable: as there is scarcely any state in Europe, where both the government and people are not assiduously zealous in establishing and improving manufactures.

It has been, nevertheless, disputed, even to the present, whether the drill or broad-cast culture be the most beneficial in general to the undertaker: or, rather, whether the first be not attended with actual loss. It is certain, that an extraordinary expence is incurred in the preparation of the land for the drill culture; and more labour is required in the subsequent operations. But accounts of experiments have been laid before the public, to shew, that this original cost is largely repaid by the saving afterwards made in a number of successive copious crops, obtained without any fallow or manure. These successive crops, even of wheat, have been said to amount to fifteen or sixteen. On the contrary, the result of other experiments is related, and calculations formed on them, to demonstrate, that the prime and other expences of this method are not repaid: the crops failing in two or three years; so as not to be worth the tillage after that time. Still other experiments, of which accurate report have been given, furnish facts, that vary from either of these extremes; and make the ballance turn on much nicer grounds of calculation of the comparative advantages of the two methods. The veracity of the gentlemen, who have given these accounts, though so different, can scarcely be doubted: and the wide variations must be ascribed to different fitness of soil for this culture, or the plants raised by it; different management in the practice of it; and the different effects of favourable or improper seasons, or other accidents. There is not, however, hitherto, so great a scope of observations made on well conducted and extensive trials, as to give room for a positive conclusion on many of the points relating to this culture: but there is great reason to conclude, on the whole, that it will be found profitable in most cases where its advocates have recommended it: especially since the later improvements of the machines or ploughs to be used in it; and of the methods of practice in other points, particularly with respect to the spaces of the intervals.

When the Society first took this matter up, the public had very little ground of known experiments and calculations, on which to form a judgment, how far it was worthy the notice of those, who are ready to adopt feasible improvements in husbandry. It was, therefore, an object very fit, and very deserving the regard of the Society, to promote such trials, and examinations, as might afford

afford just lights for a decision of this important point. They have already procured some such lights, in former years : and they have lately obtained accounts of experiments, which will be found below in these Memoirs. But, as an extensive basis of facts and observations is required for the foundation of a conclusive determination, especially with those limitations and conditions which must attend every question of this kind, they have with great propriety continued the premiums : and will, it is hoped, from year to year, gain farther accounts, that will be more and more satisfactory to themselves, and the public. In publishing these accounts, they do not mean to give a sanction to every opinion, or observation, contained in them, on their own authority : but only to transmit to the world, the notions and facts laid before them by the candidates, or other correspondents. They may, nevertheless, by the information and evidence thus obtained, and the discussion of an intelligent committee, be enabled, perhaps hereafter, to come to some final resolutions on this interesting matter ; which may have a considerable influence in overcoming the tenacious adherence to the old method. In the mean time, the world will have the benefit of the particular communications from those who gain the premiums ; which cannot fail to convey very valuable instructions, or useful cautions.

Another very material improvement of agriculture was attempted by the Society, in their endeavours to facilitate the methods of DRAINING LAND : in which they have had all the success they could desire. The greatest defect in the means of making superficial drains was, the want of some machine, of the nature of a plough, which would cut a trench sufficiently broad and deep, and lay the earth and the turf on the ground on each side, so as not to be subject to fall again into the trench.

The Society, in order to remove the impediment to the making bush drains, or trenches in ploughed fields, in a cheap manner ; the digging of which was a very considerable expence ; offered, in the year 1564, a premium of fifty guineas, for the best plough, or machine, that would cut a trench one foot in perpendicular depth, and one foot eight inches in breadth at the top, and ten inches at the bottom. This premium was adjudged, the year following, to Mr. Cuthbert Clark, after trial of a plough of this kind produced by him. But the
premium

premium was again offered for the next year, when Mr. Clark again produced a plough, of similar construction, but said to be improved. The premium was, however, adjudged, on the trial, to Mr. Knowles, of the Isle of Wight, whose plough cut a trench of one foot one inch in depth, and twenty inches in breadth at the top, and ten at the bottom; laying the earth, and turf, on each side of the trench, in the most exact and convenient manner. This was performed by eight horses, before the Committee, with great ease and dispatch. It has been observed, however, on further consideration and trial, that if this plough was made two, three, or four inches narrower in the part which cuts the bottom of the trench, it would require much less force; and yet answer the purpose equally well.

The use of this plough, for draining springy, poachy, or morass lands, cannot fail to be of considerable emolument to the public. The waste of wet lands, either by a total neglect of them, or by the occupation of them in a bad condition, is an exceeding great loss to the community: as many of these lands would prove extremely fertile when drained. The principal reason of this neglect, and loss, is, that the proprietors of such lands, though sensible of the ultimate advantage of it, are deterred, in general, from making drains, by the greatness of the expence: which, when there was no other means but digging the trenches, was, indeed, very considerable. Whatever, therefore, may in any material degree lessen that expence, must of necessity tend to remove this difficulty: and of course occasion a greater number to undertake this useful work. The cost of making bush drains is greatly reduced by the invention of such a plough for this purpose, as the Society has now procured: and where *bush* is not dear, they may be completed at an easy rate. The use of such a plough for open trenches in arable lands is, likewise, of very great consequence: as it will, in this way, be attended with very small expence, compared to the methods formerly practised.

There is a further very momentous advantage arises from the draining lands: which is the rendering the country more healthy. For nothing contributes more to the unwholsomeness of any place, than the vapours exhaled from marshy or boggy ground.

The Society have, therefore, done the public a very essential service, in obtaining for its use the invention and knowledge of so perfect a machine, wanted for such valuable purposes. The good effects indeed already appear. For above twenty of these ploughs have been made, in consequence of orders, by one person only in London: which evinces the sense that is entertained of their utility. In order, nevertheless, to bring this machine into more frequent use, it were to be wished, that the general expence of bush-draining, with the aid of such a plough, was to be ascertained, as to each particular article; and made known to the world. It would, we must allow, vary in different places, as the price of bush, labour, &c. are different in them. But, if a clear state of the particulars were given, as to any one place, it would be easy to change the rates of them; and accommodate the computation to the circumstances of any other. There is reason to believe, from good authority, and facts, that the expence of drains, when made thus, will be found much less than is commonly imagined: and that it is in the power of many, who are not apprised of its coming within the reach of their abilities, to gain great advantages by such an improvement of their land. The general knowledge of this would, therefore, encourage many to go about this important business, who are hindered from thinking of it, by the imagination of its being a matter of great expence; such as their circumstances would not bear.

The MACHINE FOR SLICING TURNEPS, was, also, an improvement, relative to agriculture, procured by the Society to the public. It is not of equal importance with some of the abovementioned objects: though it is, nevertheless, not without utility. The cultivation of turneps for feeding neat cattle has been a means of preventing the price of beef, and consequently of other flesh, from rising to a still much greater price than it has done: which must, had it happened, have occasioned the deepest distress. The scarcity of hay, after a bad season, in winters where there are long frosts, is the occasion of destroying the stock of cattle and sheep; and, consequently, of the rise of their price. The use of turneps, being a great saving to fodder, lessens the want of it; and is a very material check to those mischiefs, which
result

result from such want. The employment of land, that would otherwise be waste fallow, for the cultivation of turneps, is, also, another consequence of their use, that conduces to national good: as it increases the stock of provisions raised; and, moreover, makes some savings of expence in the culture of corn, by lessening the charge of rent that lyes on the whole rotation of crops and fallow.

These advantages have gradually introduced the use of turneps: but not so generally as it were to be wished. For it has been a discouragement to those who could not well bear such a loss, that cattle have been frequently choaked with them: particularly in the places where they are apt to be small; as is the case in stiff clayey grounds. Many instances could be given of persons, in different parts, who have suffered materially by this accident: which, though it may not much affect graziers who deal largely, may fall heavy on little farmers, to whom the value of a fat beast or two may make a great difference in their affairs. This led to the expedient of slicing the turneps by the hand, in many places, among those who had a moderate stock of cattle: for it is hardly practicable, in that way, by those who have very great herds. Mr. Wynne Baker, particularly, in his report to the Dublin Society for the year 1765, complains of his having suffered much by his cattle being thus choaked: and mentions, that he employed every night, on that account, thirteen of his people for two hours after they came from work, to slice turneps for this purpose. But there is another benefit, also, that arises from this practice: which is, that both cattle and sheep, having a dislike to the rind of turneps, scoop them; and, rejecting the outside part, make a great waste by that means. This loss is intirely avoided by the slicing the turneps: as the beasts then eat the whole without making the least waste. It has been said, nevertheless, by some, that the practice of slicing turneps is of no utility, nor answers any material purpose: as the danger of the cattle's being choaked by turneps is but small. To this it may be replied, that it is best, any danger at all of that kind should be avoided, if it can be so without bringing on a greater inconvenience: and, therefore, the proper question will be, whether the expence of slicing is not too great a rate of insurance against this mischief.

Experience has determined, to those, who have adopted this practice in England, that it is not so, even when done with the hand: and there are many, who have practised it, that use considerable quantities of turneps; and who live where most are used; and where, consequently, they have the best opportunity of forming a judgment on the expedience of it. But it prevails as a general custom in some other parts of Europe, where turneps have been applied to the feeding cattle much longer than with us: particularly in Carinthia, a province in the Austrian dominions, where great numbers of cattle are fed with this root. A great inconvenience, however, attended the slicing turneps in the way, solely practised before the invention of this machine: which was, to hold them in one hand, and strike with a knife by the other: whence, from the least inattention, the persons so employed were extremely subject to wound themselves: particularly on the joint of the thumb; where hurts in general produce very injurious consequences.

Under these circumstances, without deciding whether the slicing turneps were really an useful practice or not, a machine for saving the labour of so many people; preventing their maiming themselves; removing the discouragement to the culture of this root, where slicing by the hand was not convenient; and avoiding the waste of the turneps, by the cattle's scooping them; could not fail to be of advantage to those who before did actually practise it. For whether it be judicious or erroneous in them to follow this practice, it is better, since it is done, they should do it without the expence and danger, which attended the former method.

The Society, therefore, thought the matter worthy some notice, especially as there was a probability of success, without the being at any considerable expence: and accordingly they offered a premium of twenty pounds to the person, who should produce the best machine fit for this purpose. There were several candidates, who sent machines: among which were one or two, that would have answered the end moderately well. But one, to which the premium was adjudged, exceeded the rest beyond all comparison; and performed what was required, even beyond all expectation. It was invented by *Mr James Edgell, of Frome in Somersetshire*: and whatever

doubt the final utility of such a machine may admit, the perfection of this, as to the execution of what is intended, cannot possibly bear any. It may be easily set at will, by proper screws, to cut slices of any thickness that may be desired: and; the turneps being put into it, a man or boy can dispatch an almost incredible quantity. The particular construction, and manner of use of it, will be explained below, in the account and description of the Society's machines. I shall, therefore, only observe further here, that the quick success of the Society in obtaining this machine, is a striking instance of the effect of their premiums. For it does not appear, that such a machine had ever been thought of before; and yet, in the first year the matter was started, by the incitement and information of their advertisements, one was procured, which perfectly answers the purpose. It is, indeed, of the most meritorious construction, whether we regard the ingenuity of the contrivance; or the complete performance of the office.

The Society have, likewise, done a considerable good to the future, as well as present interest of agriculture, by the collection of various other improved machines subservient to it; which they have made for the benefit of the public. In this collection, they have not confined themselves to machines, of which they occasioned the invention by their premiums, or which were brought before them for their approbation or reward; but they have purchased, or otherwise procured several others.

Amongst these machines, there is a fine model of a **THRESHING-MILL**: which may be affixed to a common wind-mill or water-mill, and wrought by the same power as moves such mills; or by any other power of water, wind, or horses, solely applied to itself. This machine was invented by Mr. *Evers*, of *Swillington* in *Yorkshire*, since dead: who erected one at large: which continues to work. The operation of threshing is performed, in this mill, by means of a moving circular floor, on which the sheaves of corn are laid; and carried successively under a cross row of a kind of flails, placed perpendicularly; which fall on them as they pass under; and thus thresh out the corn with their ends. The strokes of these flails are so controlled by springs, that they are prevented from bruising the corn more than would happen from the most expert use of the hand-flail. There are undoubtedly par-

ticular situations where such a machine may be found of considerable utility in our own country. But in our American colonies it certainly would, in many cases, be of the utmost advantage, when joined to a mill for grinding corn.

The Society have another excellent MACHINE, of more general use, invented by the same Mr. Evers, for WINNOWER CORN. This performs its office, in the most perfect manner, with the greatest ease and dispatch; freeing at once the corn from the chaff and dust; and separating the light from the sound part of the corn. It requires very little room, or force to work it.

There is, also, another very good MACHINE for DRESSING WHEAT: for which the inventor received, from the Society, a bounty of fifty pounds.

This collection of machines contains, likewise, a number of excellent ploughs, and models of PLOUGHS, for various purposes, as *trenching; turning; hoeing; cutting, or scarifying grass land, &c.* An excellent *chaff-cutter, or machine for cutting straw* is, also, lately discovered: of which a description will be hereafter given in this work.

These machines, by being subjected to the inspection of numbers in the Society's repository, have undergone still further improvements: and have served as models for the making many of several of the kinds, which have been carried into different parts of the country: where the use of them has been by this means introduced. I shall not enumerate them here, as a catalogue will, in the course of this work, be given of the whole of the Society's collection of machines, with explanations of the use, and descriptions of such as require it, in order to their becoming more useful to the public.

The Society have, also, attempted, in other instances, the encouragement of agriculture by their premiums: some of which, being yet continued in their present list, we shall have a more proper occasion to consider them below, when we explain, as is intended, the advertisements for premiums now offered.

On the whole, the advantages the public have, and will receive from what the Society have already done for promoting agriculture, must be allowed to be very great: and there are other matters, relating to it, now under their consideration and encouragement: which, when they

they are carried into execution or compleated, will, it may be possibly presumed, prove of equal consequence.

S E C T. IV.

Of Improvements in the Mechanical Arts.

THE Society's attempts to promote the MECHANICAL ARTS, whether for the improvement of particular manufactures, or of machines for general purposes, have not been conducted with less spirit, application and liberal expence than those to advance agriculture. Their success in these attempts, may be, also, deemed equal to those exerted in the cause of agriculture: though, as they relate to subjects less commonly understood, or attended to, they have not been equally known or regarded by the public. It is, however, undoubtedly true, that the Society's endeavours have produced, in some instances, and brought to light, or introduced into use in others, the invention or improvement of several capital machines; as well as others of less importance: and excited, also, such a disposition to the study of practical mechanics, in numbers of ingenious persons, as will hereafter be productive of many beneficial consequences to the public.

The improvement of the machines subservient to agriculture, though properly belonging to the mechanical arts, in a general view, having been already considered under the head of Agriculture, will be of course omitted here. That of the others, whether relative to particular manufactures, or general purposes, will be investigated nearly according to the order of time in which the Society took them up.

One of the first and greatest articles of manufacture, which the Society embraced as an object of encouragement, was, the making CARPETS in imitation of those brought from the East, and called Turkey carpets.

The importance of this object arises from various principles. The importation of foreign carpets, at the time the Society first offered this premium, might be esteemed considerable: but the use of carpets, from the increasing luxury of the age, is exceedingly more general at this time than it was then: and the national expence of the whole, were they now had from abroad, would, conse-

quently, amount to a very large sum. A great part of this expence is saved at present, by our own manufacture of carpets; which is particularly valuable to us, likewise, from another circumstance. This is, that carding and spinning make a great part of the work: which, consequently, employ women and children; who are thus rendered profitable to the public, and moral in their conduct, instead of being burthenfome, or loose in their way of life; as they otherwise would be.

It has been alledged, that the preventing the importation of Turkey carpets, by domestic manufactures, in which there is a consumption of our own wool, was rather a detriment than an advantage to the public: because the price paid for them, at first hand, exceeded very little, if at all, the value of the wool here: and that the bringing in Turkey carpets, therefore, was, in fact, the same as the importation of so much wool into this country: our own being, by that means, correspondently saved to be used in other manufactures, where the greater proportion of labour yielded a much greater return. This argument would, perhaps, have great weight, if the use of carpets was as limited now as formerly; and the wool employed in making them, was fine, and proper for more valuable manufactures. But, the much more general use of carpets, if our own manufactures had not supplied the greatest part, would have highly raised the price of them: in which case, we should have paid considerably to foreigners for the labour: and the coarse and refuse wool, that could not find an adequate application to other purposes, being the kind mostly employed for this, is thus consumed and rendered profitable. Domestic manufacture of carpets, therefore, tends, instead of depriving the other manufactures of their wool, to the encouragement of the production of it, in general, by affording a vent to this kind.

The weaving of carpets has, moreover, a great affinity with that of tapestry; or, in fact, they are only different branches of the same manufacture. The improvement of one, consequently, carries with it that of the other: and we, accordingly, have seen, that along with the establishment of carpet weaving, in our own country, tapestry weaving was introduced, and carried to a very high degree of perfection, in more than one manufactory.

nufactory. This makes a national faving, of which the far greateft part of the expence lies on the work ; and prevents our fending confiderable fums to France : which had poffeffed itfelf of the more perfect practice of the art of tapeftry weaving ; and fold part of the produce to us, at a very high price.

The Society were, therefore, very judicious in the choice of this, as one of their firft objects in the encouragement of manufactures ; and their fuccefs has been correfpondent. For, in 1757, claims were made : and premiums, of twenty-five pounds each, adjudged to two candidates, for fpecimens which gave great fatisfaction. In 1758, one of the fame candidates received another premium of twenty-five pounds ; and another candidate the like ; for ftill greater improvements : and, in 1759, two other premiums were given ; the firft, of thirty pounds, to a candidate who had received thofe of the preceding years ; and the fecond, of twenty pounds, to a new candidate. The Society, then thought this article fufficiently introduced : and difcontinued their premiums. But application was made to them, in the fucceeding years, for liberty to expofe to public infpection, in the great room of their meetings, fome other fine fpecimens of further improvements : in confequence of which, the manufacturers obtained the notice of the public ; and the means of great encouragement and demand for their works.

The Society may, from thefe premifes, be juftly deemed to have contributed, in a very high degree, to the introduction of thofe extenfive and valuable manufactures of carpets, eftablifhed in various parts of Great Britain ; as well as to that of tapeftry ; which now yield a very confiderable national faving or profit.

The procuring *paper proper for printing with copper-plates*, to be manufactured in England, was another of the Society's firft objects of the fame kind. They were induced to turn their regard to this article by finding, that a very confiderable fum was paid to foreigners, particularly the French, for this fort of paper ; which rendered it a matter of national importance.

The Society accordingly offered premiums on two conditions. The one for making a fpecimen of fuch paper proper for receiving impreffions of the beft copper-plates,

as should be nearest in all its qualities to the French : of which specimens were to be obtained at the Society's office. The other, for making such paper equal in all its qualities to the French. The first of these has been three times gained. The first time in 1757. The second and third times, by the same candidates, in 1763, and 1764. Other claims have been since made, but were not allowed. The premium for making this paper equal in all qualities to the French has never been yet obtained : though the Society's endeavours have procured the manufacture of an inferior kind, which answers for common purposes ; and makes a national saving.

There is, indeed, an exceeding great obstacle to the making perfectly good fine paper of any kind in England : and, more particularly, of the sort proper for copper-plate printing. This is, a very faulty method, introduced almost generally into the manufacture of paper : which consists in chopping the linnen rags, of which the paper is to be made, instead of beating them into pulp. In this improper manner of preparation, the fibres of the linnen are divided into short parts : which destroys the staple ; renders the paper less tenacious ; and makes the use of a greater proportion of gum necessary. This gum, moreover, cracking by the wear, divides the paper : or, being taken out by moisture, the paper is then rendered exceeding weak ; and subject to be torn with the least force. This faulty mode of manufacture produces a still greater inconvenience with respect to paper for printing with copper-plates than for any other kind. As there is an indispensable occasion to moisten it to a considerable degree, in order to bring it to a due softness for receiving the impression : and the gum, on which the tenacity of the paper formed of cut rags principally depends, being, by this means dissolved, the texture of the paper is proportionably injured. The last specimen brought to the Society was an evident instance of this : as it lost almost all its cohesion, by being wet in the due degree for printing : and would hardly bear in that state to be laid on the press. It is probable, therefore, this improper treatment of the materials is the principal impediment to the effect of the Society's premiums, in producing paper of this sort fully equal to the French ; and will, if not avoided, be so to all improvements of the finer kinds of paper in England.

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The spinning of Flax, Wool, and Cotton, was another most material article in this class, which the Society took early under their encouragement. It is unnecessary to expatiate much on the importance of this work: as very evident reasons demonstrate it. Not only several of the most staple manufactures of our country depend on it; but it is the most general employment of the female sex; who are capable of managing one branch, or other of it, at almost every age: whence it must be allowed, nothing could be more beneficial to the public, either in a political or commercial view, than the supplying means to promote the more general application of idle hands to spinning. The Society, therefore, set about to attain this great end by various means.

They furnished incitements to industry in this work, by premiums for the greatest quantity of linnen, woollen and cotton yarn, spun in one year in work houses. They strove to establish this useful species of manufacture in them, because there the poor are for the most part, to the public loss, maintained by the public in idleness. They attempted to improve the practice of this art in England; and to introduce the spinning those finer kinds of thread, or cotton yarn, which we are at present furnished with from foreign countries. But the most efficacious, and proper means, by which they essayed to encourage spinning, were the efforts to procure improvements in spinning-wheels, and the other instruments subservient to spinning: such as reels for winding, twisting, &c. This was the method most consistent with the principles of the institution of the Society; as well as with the means of their influence: and it was accordingly attended with the most obvious success.

The premiums for spinning fine, were claimed each successive year, from 1759 to 1766 inclusive. At which time they were discontinued along with others, to make way for that variety which is necessary in the objects of the Society's premiums.

The premiums for spinning in workhouses were claimed in the years 1759, 1760, 1761: when they were likewise discontinued.

The general effects of these premiums, with respect to the Society's views in them, are not easily to be distinguished: nor does it seem that inciting some particular persons to exert themselves to gain premiums by their industry,

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or application to fine spinning, can have any very extensive consequences.

On the other hand, the improvement of machines, or instruments, by which more work can be done with equal ease; or the same with more ease; will always, when made public, be an encouragement to the respective manufacturers who are to use them; and will, consequently, ever engage greater numbers to undertake the work. And such improvement of machines, or instruments, depending on the skill, ingenuity, or application of a few particulars, the Society's rewards may be, and indeed in almost every instance have been found, adequate incitements to those, who are capable of performing the matters of this kind proposed. The Society, being now well apprized of these principles, have, in general, discontinued those premiums, where labour and industry only, without novelty, invention, or improvement, were in question; and confined their views to those matters, where invention, or the diffusion of material information, make the object.

This is most particularly evident in the instance before us with regard to spinning: several very essential improvements having been made and brought into practice by the Society's endeavours.

The Society offered three kind of premiums, respecting the perfection of spinning-wheels, and the operations subservient to spinning. The first was for the greatest improvements in the common spinning-wheel: either for wool, cotton, flax, or silk. It was originally thirty pounds.

In 1761, the Society advanced this premium to forty pounds.

They again increased the same in 1762; and offered fifty pounds, as a first premium; and twenty-five pounds as a second. These premiums were continued to 1766: and then omitted, to make way for fresh objects of the Society's views.

In 1761, the premium was allowed to two candidates; and divided between them, in the proportion of twenty pounds, and ten pounds.

In 1762, thirty pounds, part of the first premium, was adjudged to one candidate, for an improvement in the long-thed spinning-wheel.

In 1764, fifty pounds, being the whole first premium, was adjudged to a candidate for an horizontal wheel for spinning with both hands.

In 1765, twenty pounds, part of the second premium, was adjudged to a claimant for a vertical spinning-wheel for both hands.

In 1766, thirty pounds, part of the first, and fifteen pounds, part of the second premium, were also given to other claimants, for improvements in the common spinning-wheel.

The horizontal wheel, to which fifty pounds was given, had great merit, as it performs perfectly well the office of spinning with both hands at the same time. It is now introduced into practice, particularly in the Foundling Hospital; and is found of great use. The advantage of spinning with so great dispatch tends to the emolument of the public, not only by occasioning more work to be done by the same number of hands, and extending the manufactures dependant on spinning, by lowering the price of the commodities produced by them, but by inciting numbers to apply themselves to spinning, in consequence of their being able to earn more money by their labour.

In the other premium respecting spinning-wheels, the Society carried their speculation further than the improvement of the common kind. They offered a reward for the best invention of a machine that would spin six threads of flax, cotton, wool, or silk; and require only one person to work and attend it. This would have been a desirable improvement, if it could have been attained in a manner fit for practice: but it seems attended with almost insurmountable difficulties. A machine, by which one person may spin six threads at the same time, must be complex; and necessarily liable to be put out of order; whence also it must be expensive in its original purchase, as well as repair. If the spinning be performed in such a machine by the fingers, it will demand much habit, to gain the dexterity requisite to so nice an operation; and also a very close, and of course a very tiresome, application to the performance. If it spin of itself, and only require to be moved, as to the original power, or rectified when any parts fail, it will want, as appears from the most elaborate experiments, a peculiar mode of carding: which, by the expence of the cards, and the labour; together with that of the prime cost and repair of the machine; renders this kind of spinning, on the whole, at least equally expensive, and much more difficult than the use of the common spinning-wheel; more especially that of the two handed one above mentioned.

I am authorised to give this judgment on the principle of spinning by mechanism, instead of the hand, from my own observations, as well as those of two other very judicious members of the Society, who were best acquainted with that matter, in the spinning machine invented by the late Mr. Paul: which carried this application of mechanics to the greatest extent, it is perhaps capable of. By a very great expence, and the assistance of the most ingenious theoretic, as well as practical mechanicians of our time, he attained to the construction of a machine, that being moved by water, horses, or any other power, would spin, in the most perfect manner, any number of threads, without other assistance of the hand, than to supply the carded cotton, take away the finished roll of thread; and rectify any accidental disorders of the operation. But the delicacy of the work of the machine, equal almost to that of clocks, which subjected it to be so easily disordered, and at the same time so expensive to be repaired; and the peculiar manner of carding, which was, likewise, very expensive have occasioned this machine to be now wholly laid aside as unprofitable, after sixty or seventy thousand pounds have been spent in various attempts to establish its use.

The Society, however, offered in 1760, a premium of forty pounds for the best, and twenty for the next best construction of a wheel or machine, that would spin six threads of wool, cotton, flax, or silk at the same time; and require only one person to work and attend it. In 1761, this premium was raised to fifty pounds for the best, and twenty-five pounds for the next best: and, in 1762, it was again augmented to one hundred pounds for the best, and fifty pounds for the next best.

In 1763, part of the second premium, of twenty-five pounds, was given for a machine of this kind, or rather an attempt towards such a machine: which was the only reward adjudged for this matter: and the same year the premiums offered on this score, were wholly discontinued, for the reasons above alledged.

The Society, also, in 1764, appointed a premium for the inventing the best portable machine for winding and doubling worsted, cotton, or linnen yarn, not less than twelve threads at one time. These premiums were fifty pounds for the best; and twenty-five pounds for the next best. In 1765, they altered the expression of their advertisement; and offered the same premiums for inventing the
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best portable machine, for winding from the skain, and doubling worsted, thread, or cotton, not less than twelve single threads, into three or four threads in each twist : and they reduced the quantity of the reward to twenty-five pounds. The year following the whole was discontinued.

In 1765, twenty pounds, part of these premiums, was adjudged to be equally divided between two claimants, for machines of this kind, that had some merit ; but did not come up to the full perfection the Society conceived might be attained. In 1766, twelve pounds, part of the premium of twenty-five pounds, was, also, adjudged to another claimant, for such a machine as was described in the advertisement of 1765 : which was deemed an improvement, but not to the first degree of perfection.

All these spinning-wheels, &c. are retained in the repository of the Society's machines : where they may be seen, or models taken by manufacturers, on due application for leave to the Society.

The making DRUGGET in England, *fit for the Lisbon market*, was another of the early articles relating to manufactures, of which the Society took up the encouragement. The reason of their attention to this matter lay in these circumstances. The French dispose of a great quantity of drugget at Lisbon : and from the neglect of our not making the proper kind, we obtain no share of this trade : though, as far as appears, we might rival the French in it, if we were to pursue the proper means.

The Society, therefore, considering the extension of every branch of the woollen manufacture, as a material advantage, thought fit to offer a premium of twenty pounds for the making a piece of drugget, nearest in quality and price, to a sample of the French, exhibited to view in their office : and to the next in merit, ten pounds.

Claims were accordingly made ; and, in 1759, the premiums of twenty, and ten pounds, were adjudged to two claimants, who produced satisfactory pieces : and, again, in 1760, and 1761, the first premiums of twenty pounds were allowed to other claims.

It now appearing, from these samples, that we were in possession of the means of making this kind of drugget in considerable perfection, the Society changed the terms of their advertisement ; and offered thirty pounds as a first premium, twenty pounds as a second, and ten pounds as a third, for assortments of druggets, of the same kinds as the
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the samples to be seen at the Society's office, the cheapest and best in quality, from sixteen pence, to twenty-two pence per yard. The assortments to consist of at least three pieces.

In 1762, the first premium was given: and the whole was discontinued by the Society, on the presumption, that the end was obtained, as far as their endeavours could conduce to it.

In consequence of the pieces produced to the Society, several considerable orders were given by some merchants to the respective manufacturers. But it does not appear, that any material advance is since made in this article of trade.

The Society, nevertheless, gave the matter a fair chance, by bringing the manufacture to due perfection: and it is owing to exterior circumstances, attending the course of our trade with Portugal, that their views have not yet succeeded better. This is, however, to be less regretted, as it does not appear, that the establishment of new branches of the woollen manufacture would be followed with a certain advantage: For, without the price of labour were kept down, by a proportionable augmentation of the number of hands; and that of wool, by an increase of the quantity; such new manufactures might only embarrass those we now possess; which are of the most staple kind; and, perhaps, in that light do more mischief than good.

The Society, also, entered more lately on another matter of a similar nature to this. It was the introducing a manufacture of a light spungy fine *broad cloth*, for which there is a considerable demand at the *Lisbon*, and other markets, that supply cloth for the use of the southern countries.

The Society's speculation on this subject arose from their being urged to offer premiums for our vying with foreigners in their dyes of black and scarlet. The reasons for this were, some erroneous notions, then pretty general, that the black and scarlet colours of cloth were much better dyed by foreigners than ourselves. On canvassing this point, the fact itself was denied by those, who were best acquainted with the matter: and they asserted, that we really had now the art of dying these colours in equal perfection with any other country; and did actually dye them as well. It was allowed, however, that foreign cloth had a better appearance as to colour; and even that this colour was more durable in the wear. But this was ascribed to another

another principle; and not the superiority of the dye. It was advanced, that the cloth made for the use of the southern countries was of a different manufacture from ours; and, being much lighter, and of a more spongy texture, imbibed the dye throughout the whole substance; which both gave a greater force of the colour to the eye, and rendered it more lasting in the wear: since it penetrated the whole substance of the cloth; and could not be worn off as in our cloth, where it tinged only the surface. On the difference of opinion, with respect to this fact, the Society procured the most perfect specimens of such cloth, both dyed in France and Holland: which being examined and compared with ours, it appeared, that our dyes were equal, if not superior, to the best of the others.

The Society, therefore, induced by the above-mentioned reasons, which availed in the case of the drugget, thought fit to offer premiums for the manufacturing such light spongy cloths: and in the year 1764, they published the following advertisement.

“Whereas, notwithstanding the manifest superiority of the best English broad cloths, there is a kind of fine cloths in much demand at several foreign markets, and particularly those of the southern countries of Europe; especially of the following colours, viz. scarlet, black, blue, green, and white; the chief recommendatory qualities of which cloths are fineness, lightness, and a sponginess of texture, that serves effectually to imbibe the dyes; so small a degree of pressure, as will not injure the colours, or occasion spots from rain; and a peculiar kind of list, which is essential in some uses; the Society, from a desire of contributing all means in their power for extending our most valuable commerce in exported manufactures, do offer the following premiums, on the conditions annexed.

“To the person, or persons, being partners in trade, who shall, on or before the first day of December 1765, have made, and sold the greatest number of pieces, not less than thirty, of such cloths as are above described, and according to the patterns delivered; each piece to be as wide as the pattern, and of the usual length of broad cloth; one hundred pounds.”

A second premium of sixty pounds was, likewise, offered for the next greatest number, not less than twenty such pieces: and a third of forty pounds for the third greatest

number, not less than ten. They required, also, a piece dyed either black, or scarlet, and properly pressed, should be produced to the Society for their inspection: and they subjoined, moreover, this *nota bene*.

“ N. B. Patterns of those kinds of cloths, for which these premiums are offered, are ready to be delivered, by the register of the Society, at their office in the Strand. But as the nature of markets may make an assortment of qualities requisite, the candidates are hereby informed, that the Society allows of varying the qualities of their cloths, for the sake of assorting them, provided the whole extent in the variations in pieces, do not exceed the limits of two shillings per yard. However, the pieces sent in for inspection must be of the best quality.”

This premium, nevertheless, was not obtained: but was again offered in 1765.

In 1766, a change was made in the quantum of the premium, and number of pieces of cloth. The premiums were then reduced to forty pounds for the greatest number; and twenty pounds for the next greatest. And the limitation of the number was reduced to ten, and six pieces.

Claims were made for this premium, but never allowed. But that is no great matter of wonder: For though there was one stated object in view, intelligible enough to those, who were well acquainted with the Lisbon trade, to which this premium principally had regard; yet it was too complex to be precisely express'd in the Society's advertisements, either to the understanding of the manufacturers, or even of the body of the Society, who were to determine on the claims. This rendered the matter less proper for the concern of the Society: as every thing for which any premium is offered, should be of such nature as admits of clear and distinct conditions, that can be comprehended by the members in general. Besides this, the same circumstances, which were before mentioned with regard to the drugget, hold good here with respect to the dubious importance of the manufacture of this kind of cloth. For, unless we multiply the number of hands, or augment the quantity of wool, we should only change the mode of the woollen trade; and not really add to it by the introduction of new branches. And as this premium was to operate, by the encouraging the art of making slihter and worse cloths than we at present make, the object was a less desirable matter at the time, when there seems too great a disposition to do it,
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without any incitement but what arises from the present state of trade and the sordidness of the manufacturers, to the injury of the staple of fine strong broad cloths, in which we have been hitherto unrivalled.

Another of the earliest objects of the Society's pursuit was, the procuring a PERFECT HAND-MILL FOR GRINDING CORN. The difficulties under which the common people at that time laboured, with respect to the price, and adulteration of bread; and the change, or mixture of flour at the mills; rendered this an important consideration: as every family, which suffered by these inconveniences, might by the aid of such a mill, be enabled to avoid them, by grinding their own corn, and making their own bread. Besides this general advantage, there were others, that would have accrued from the obtaining the perfect construction of such a mill, with respect to particular places, as well in Great Britain, as the colonies, where the difficulty or delay attendant on the sending corn to public mills; or, in some cases, the total want of them, or some such commodious substitute; occasions great embarrassment.

The Society, therefore, offered a premium of fifty pounds to the person, who should produce the best hand-mill: being such as would answer the end. And in 1757, the premium was divided between two candidates, for two mills, which were thought to have some merit; though not to be perfect. Of these, one of them was a steel mill. In 1758, the whole premium of fifty pounds was given to another candidate: and the advertisements were then discontinued. But a bounty of fifty pounds was afterwards given, in 1761, to a person who voluntarily offered such a hand-mill to the Society, as was deemed preferable to those before obtained.

The obtaining a complete hand-mill for grinding corn is a very desirable matter; and was well worthy the attention of the Society. They took the best means in their power to obtain it; as well by their offer of premiums, as an attentive application to the examination and trial of the mills brought before them: and they expended an hundred and fifty pounds in the pursuit. But, nevertheless, though hand-mills, on those constructions they have procured, will, in some degree, answer the purpose; yet the best of them is not perfect: and it still remains as an object of mechanic invention, to find such a construction of a hand-mill for grinding corn, that will perform its office com-

pletely ; and not be subject to some material inconvenience. The principal difficulty consists in this circumstance : that the weight of such stones as can be commodiously moved by the hand, is not like those in large mills, sufficient to bruis the corn to the state of fine flour without a great velocity ; and close affixment of the stones, in the part where the fine pulverization is to be performed : and such velocity and closeness not only wear the stones extremely fast, and are liable to other mechanical inconveniences ; but heat the flour till it concretes, or, to use the miller's word, *grease* it ; and much deprave it in other respects. Iron mills are exempt from the first defect ; and can be made to pulverize to any degree. But they heat much more than the stone mills ; and are apt to damage the flour in a worse manner, both by greasing and smutting it. Besides their being subject to rust, and even to be corroded, if they be not carefully preserved from moisture, and cleansed : which requires more trouble and attention, than are generally bestowed on such matters.

The introduction of the MANUFACTURE OF PAPER from SILK RAGS was, also, early attempted by the Society. This was a new matter : as it does not appear, that any such paper had been before made in England.

The reasons which prevailed on the Society to undertake it were these. It is well known that the Chinese, among the various other materials of which they make paper, use waste silk ; and produce from it, some kinds, that are peculiarly adapted to particular purposes. Indeed, to those who are well acquainted with matters of this nature, it is obvious, that any fibrous or filamentous animal or vegetable substance may be wrought into paper. From hence it was evident, that silk rags could be applied to the making a valuable kind of paper : and, as they are not at present converted to any useful purpose whatever, it was apparent, that a considerable loss accrues to the public from the not employing them in this manner : supposing it practicable with relation to the returns and profits of the manufactures, who may undertake it. This was an exceeding good foundation for the Society to take up the matter, and try, by their intimation of the facts, and pecuniary encouragement, to induce some proper persons to enter on the attempt of making such paper.

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These had their desired effect: and, in 1759, claims were made for very good specimens of such paper, and allowed. The first premium of twenty pounds, and second premium of ten pounds, were adjudged to two candidates. The same premiums were again given in 1760. But, at that time, there appeared, from the experience which the candidates now had, a very great obstacle to the progress of this manufacture. The varying colour of the silk rags, as they are promiscuously collected, subjected every parcel of them to be of a different colour: unless they were assorted, and used separately, or mixt in regular proportions. This rendered the parcels of paper produced of correspondent different colours, where the assorting was not practised; and prevented the manufacturer from being able to supply considerable orders according to any specimen, by which they had obtained such orders. The assorting the rags seems, indeed, an obvious and certain remedy for this inconvenience. But it was found to be attended with such an expence, as the price, for which the paper could be sold, would not bear: and, moreover, the mixture of colours, when the whole set was taken in, produced a brown of a darker hue than was desired in this kind of paper. Hence arose a discouragement to the manufacturers: and the Society took it under their consideration to procure a remedy for it. They therefore, in 1760, offered a premium in the following manner.

“ For making silk rags more commodious, and ready
“ for the use of the paper manufacturer, to save him
“ time, and the assorting and ranging them in several
“ classes, as is now the practice, the Society will give
“ a premium of ten pounds to any ingenious person,
“ who shall, on or before the first Tuesday in December
“ next, discover, and produce to the Society, the most
“ effectual method, by some easy, expeditious, and cheap
“ process, how the various colours may be readily dis-
“ charged out of a large quantity of silk rags: which,
“ when thus discharged of their colours, shall, never-
“ theless, still keep their strength firm as before: and
“ be no ways rendered unfit, by such process, for the
“ purpose of making silk paper; in order that such me-
“ thod may be published for the benefit of the paper
“ manufacturer.”

“ N. B. All persons are desired to save their silk
“ rags.”

A claim was made of this premium. But the method proposed was too expensive and laborious to answer the end; and was, therefore, rejected. A member, who was particularly well versed in matters of this kind, had at this time made himself master of such a method, as would have answered: and he promised to lay it open to the Society: in consequence of which the advertisements for the premium were discontinued. Some accidents, however, prevented this from being done: and the great multiplicity of objects, which, at that time, occupied the attention of the Society, occasioned any further proceedings, with regard to silk paper, to be neglected. It were, nevertheless, to be wished, as the difficulty with respect to the colour of the rags could be removed, that this laudable attempt should not be frustrated; as it will be, without further means be taken on the part of the Society to effectuate it. They have produced proofs, by the specimens now in their hands, of the practicability of making such paper, even commercially considered, when the obstacle of the colour of the rags is removed, as it easily may be. They have, also, by the same means, shewn the utility of such paper. The furnishing the knowledge of discharging the colour from the rags, together with some moderate encouragement to begin a manufacture, would, in all probability, establish this article; and procure the making a kind of paper wanted much for some material purposes; as well as prevent the total waste of silk rags which now prevails.

The Society very early took up, as we have before seen, the improvement of HAND MILLS; and sensible of the great importance of grinding corn in any way, well, and at cheap rates, they extended their views to other mills for that purpose. They not only endeavoured to effect this matter, by mechanical improvements, but by the procuring more easily the most important part of all such machines; the MILLSTONES. On observing, that the only good stones of this kind were to be obtained from France; and, consequently, that few others were employed; they thought this concern well worthy their consideration. The purchasing these stones of foreigners occasioned a national loss of so much as the
price

price we paid for them. The distance of conveyance rendered them of course dear; and gave a temptation, in some cases, to use a less perfect kind. And the public were, besides, subject to some danger that accident or design might some time deprive us of the means of obtaining them on any terms. It was, likewise, reasonable to believe, that, in the great varieties of quarries, which our country, and, indeed, all that have mountainous parts afford, such a kind of stone might be found, as would be equal, or perhaps superior to the best we obtain from foreigners for this purpose. These reasons induced the Society to take up this matter: and, perhaps, when well weighed, they will appear very momentous.

In 1758, they published the following advertisement of premiums for millstones.

“ The price of mills for grinding corn, being greatly increased, by the use of French, or other foreign millstones, and it seeming probable, that stones of the same, or at least as good a kind, may be found in this kingdom, the Society propose to give for making and producing, on or before the first Wednesday in April 1759, the best and cheapest *pair of millstones*, not less than twenty-five inches diameter, of English stones or burrs, that shall be nearest in goodness to the millstones made of French burrs, for grinding wheat, and other grain, fifteen pounds.

“ For the second best, ten pounds.

“ For the third best, five pounds.”

This premium was gained in 1759, by two claimants, for millstones, which met with the approbation of the Society. Their resolutions on the merits of them were, “ that they answered in every respect to the terms of the advertisement.” But that did not require them to be equal to the best French millstones: and we may conclude, they were not. Since they have not excluded the use of the French: which still maintain the reputation of being the only good millstones. The Society, however, discontinued the premiums, thinking they had done all in their power to promote the object of them: which was, to give such an intimation to the public, of the utility and probability of finding good millstones in England, as might procure a due regard to it. And, though this attempt has not had, hitherto, a success adequate to the

views of the Society ; yet it is to be hoped, as the discovery of such a kind of stone may be attended with great emolument, both to the proprietor and the public, it will engage those, who are properly situated, to make the pursuit ; and be at length the means of attaining the Society's end in this matter.

The mechanical improvement of *corn mills*, wrought by *water* and *wind*, was likewise taken in hand, with spirit by the Society ; and with a success, that cannot fail to produce real advantages to the public.

The construction of common water-mills was already carried to such perfection, at the time the Society embraced this object, that it seemed needless to offer any premiums on their account. But the construction of that kind, called *TIDE-MILLS*, which require a peculiar mechanism to adapt them to the action of the stream, conveniently, constantly, and advantageously, was in a much cruder and less improved state ; and, consequently, appeared to admit of being brought nearer to perfection by due encouragement.

The public utility of tide-mills is very considerable. Water-mills, which work continually, have a great advantage over wind-mills : as they are subject to be frequently and long stopt, on account of calms, or to be destroyed by storms, to the inconvenience, and sometimes even distress of the neighbourhood, which depends on them for the grinding their corn. Water-mills are, therefore, justly preferred, where the presence of a proper stream gives an opportunity of using them. And, as there are many situations on the banks of creeks of the sea, or large rivers, where there is not a constant current, but only a flux and reflux from the tide, it was necessary, in order that these mills might be more generally erected, to invent a peculiar construction, which might render them capable of working under this change of the course of the current ; and under that very great additional difficulty, the constant alternate rise and fall of the level of the surface of the water. But these difficulties being surmounted, a number of places, now deprived of them, might be provided with water-mills, not only for corn ; but for other offices subservient to manufactures and commerce.

The advance, however, towards a perfection in the construction of such tide-mills, not having then gone far, the

the Society, in 1759, therefore, offered a premium of fifty pounds to the person, who should invent, and produce to them, the best model of a tide-mill; such model being capable of trial by water.

In 1760, two claims were allowed: and twenty pounds were adjudged to each of them. In 1761, the whole premium of sixty pounds was given to a candidate; the construction of whose model was deemed to have great pretensions: and another candidate, having produced a model of some merit, a bounty of ten guineas was given to him. The Society now discontinued their premium respecting this object: the end being presumed to be answered. But, in 1762, another model, constructed on principles different from the others, having been produced to them, they gave a bounty, to the inventor, of twenty guineas. The Society, retaining those models in their repository, have procured, to those, who may be disposed to enter on such an undertaking, the means of erecting tide-mills on an improved and good construction; and, consequently, have furnished an encouragement to the encreasing the number of such mills: which, in many places, particularly near the sea-shore, or when small streams are wanting, but where creeks and large rivers are found, would be of great utility to the respective neighbourhoods, and of course to the public, by conducing to supply the poor more cheaply and easily with bread.

The accidents and variation of the moving power to which WIND-MILLS are subject, occasion the perfect construction of them to be an object of far-greater art and difficulty than that of water-mills, moved by a regular current. Many attempts had been made to remedy the defects: but much was still left behind, to render them capable of acting under all circumstances with the greatest power; and yet not liable to the damages or destruction, which sudden violences of the wind might occasion. This made the improvement of them a very fit subject of the Society's regard: and they, accordingly, took the same measures to effectuate their views, as in the case of tide-mills.

In 1759, they published this advertisement.

“ To the person, who shall invent and produce to the
“ Society, on or before the first Tuesday in April 1760,
“ the best model of a wind-mill, in which the number,
“ form,

“ form, size, and position of the sails are such, as produce the greatest effect from the action of the wind in all its various velocities; and the machinery of the whole to communicate, in the most simple manner, a proper uniform motion to the shaft of the mill, in all the variations of the wind’s velocity. The model to be made by a scale of one inch to the foot. Fifty pounds.”

This premium was claimed in 1760, by one candidate, to whom the whole fifty pounds was adjudged. In 1761, a bounty of fifty pounds was given to a person, who produced to the Society, a model, which was deemed superior in merit to the former one. And, in 1762, a like bounty of fifty pounds was given for another model of still greater merit than any before offered to the Society.

In 1761, there being reason to believe, the attention of all those, whom the Society’s premiums might lead to engage in study or experiment on this subject were incited; they discontinued the premium: and the public owe to their encouragement the several very material improvements in this most important machine: some of which have been since carried into practice. The benefit of these improvements, it is presumed, will now be more largely extended: as the public will be more generally apprized of the merit of them; and as they may be brought into use by any desiring it, in consequence of the models retained by the Society: who, on application, through any member, or by other means, permit the liberty of having such draughts, or measurements of them made by workmen, as may be necessary for the erecting the machines in large.

There seems only one further improvement wanting with respect to wind-mills: and that is now under the consideration of the Society, in consequence of some models, which have been lately brought before them. It is, a perfect construction of an horizontal wind-mill. Many constructions of such mills have been produced: but none of them, which are publicly known, are free from those defects and inconveniences, that render them inferior to the vertical wind-mills. It is certain, however, from the tried fact itself, that a well constructed horizontal wind-mill is preferable to the best vertical. There is now in Suffex such a mill; which has been continually in use near thirty years: and

and the proprietor, who has great skill and experience in this way, is now going to erect another very large one. A testimonial of his opinion of the comparative superiority of horizontal to vertical wind-mills, given to his son, is in the hands of the Society. It were much to be wished, that his or some other good construction of such a mill were known: as this kind of wind-mill might be erected at a much less expence than the common vertical mills, and be exempt from the danger of being destroyed by storms, to which they are subject: whence would result an encouragement to erect wind-mills, where they are now wanted.

The manufacture of CHIP and STRAW HATS, like the Italian, for women, was likewise another matter the Society early set about to encourage. The chip hats of that kind make a very considerable article of commerce at this time. The Italian straw hats, commonly called *Leghorn hats*, were also, at the time the Society took up this matter, greatly in use: but the change of a fashion has since much lessened the demand for them; and increased proportionably that of the chip hats. These hats, being purchased of foreigners; and being, moreover, the produce of labour, and principally that of women and children; there appeared no reason, why we might not supply ourselves with what we demanded: if the art of making them was well understood; and some proper manufactories established, to give the example, and put this matter in a right train.

Accordingly, in 1760, the Society advertised, that they would give ten guineas to the person, who should produce the greatest number of chip hats, not less than a dozen, to be made in England, nearest to the best Italian, in lightness, stiffness, and workmanship: and five guineas to the person, who should produce the next greatest quantity under the same limitations. In the year 1761, the Society thought fit to make an alteration in their advertisement for this article, requiring the person, to whom the premium should be adjudged, to undertake to supply a quantity, not less than two hundred dozen, if demanded, at a stated price, to be given in by him, along with a sample, not less than twelve, to the Society. In 1762 a further alteration, still, in the advertisement for chip hats: took place, as well as in the premium. For now the Society offered three guineas each, to such persons, as should make and produce, at least, a dozen good chip hats, made in the manner of
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the Italian. But if there should happen to be more than seven candidates intitled, then twenty-one guineas to be divided among them, according to the quality, goodness, and cheapness of the hats. And to the candidate, whose hats should be deemed the best among the whole, two guineas over and above the three given in common with the rest: the Society, at the same time, retaining a dozen of these hats, which should gain this additional premium. In 1763, another alteration, though less material, was again made in the form of the advertisement. In this, the Society desired two dozen of hats to be produced to them as a sample: but agreed that only half a dozen of those which gained the first premium, should be retained. Every candidate was, likewise, directed to mention the price of their hats, and were to oblige themselves to supply fifty dozen at the stated price given in, if requested of them. In 1764, the advertisement remained as in the preceding year: and, in 1765, it was discontinued: the Society having by this fair trial, carried their attempts to establish this manufacture as far as lay in their power.

There were, in 1762, two claimants for the premiums for chip hats: and their performances were thought deserving of what the Society had offered. Ten guineas were accordingly adjudged to one of them; and five guineas to the other. In 1763, there was only one candidate; to whom three guineas were given. In 1764, two claims were made for the premium; and five guineas, conformably to the advertisement of that year, were adjudged to one and three guineas to the other. In 1765, the premium was again claimed by one person: and three guineas were adjudged to him.

The premium for straw hats, like those called Leghorn hats, was never obtained.

However, in the course of offering these premiums, the Society gained information, that one of the most advantageous materials for making straw hats was not to be procured at present in England. This was a vegetable production called *platt*, that is to be obtained at the Bermuda and Bahama islands. It had been formerly brought from thence hither for that purpose; but since the losing the manufacture of this kind of hats, probably from being underwrought by the Italians, the importation of it had been discontinued.

The Society, therefore, thought it a proper measure, in order to promote the re-establishment of the manufacture
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of Leghorn straw hats, to offer a premium for the importation of PLATT into England; and advertised, in 1760, that they would give twenty pounds to the person, who should import from the British American colonies, the largest quantity, not less than one ton weight, of that *species of platt*, which was heretofore brought to this country in considerable quantities, from the Bermuda, and the Bahama islands. And ten pounds were to be given for the next greatest quantity, not less than one thousand pounds weight.

The premium was not claimed: and the advertisement was discontinued the next year.

It is not extraordinary, this was not claimed. For premiums, that are intended to operate in the colonies, have been found to have a slow effect: and, if not continued for a length of time, to fail of any. It is, however, less to be regretted, that the attempt to promote the importation of platt did not succeed: because the kind of hats, for making which it was intended, is but very little used in comparison of what it was. The demand for chip hats is, on the contrary, much increased: and the manufacture of them here is gaining ground. Whence we may hope, the event of the Society's proceedings, with respect to them, will be, the bringing at length the whole of this article into our own hands: which is more particularly valuable, as was before observed from the kind of labour it requires; which employs the most helpless and burthenful part of the community.

With respect to the Leghorn straw hats, as the difference of the price of labour seems to be the cause why the Italians got it from us: it is not likely we should recover it, while they can rival us with the same advantage. A prohibition of, or a great duty on, the Italian hats is therefore previously necessary to the success of any premium on that score.

The making CRAPES FOR HAT-BANDS, like those imported from Italy, was another article of the same kind: which the Society then adopted, as an object of encouragement. The demand for these crapes was very considerable: and the labour being the principal part of the original cost in the making them, rendered it still more desirable to us. As to the probability of our attaining the art, or the other means of establishing this manufacture, there seemed to be very little reason to doubt of surmount-

ing the difficulties, if any persons of spirit would procure the information of the Italian method of practice with regard to it ; and persevere in those trials, and efforts, which are necessary to bring newly introduced manufactures to perfection in a commercial view.

The Society, therefore, very properly, as the event has shewn, chose this as one of the objects of their premiums : and they offered, in 1759, thirty pounds to the manufacturer, who should make the largest quantity of crapes, not less than one hundred yards, to be nearly equal in goodness to the best foreign crapes. In 1760, the Society augmented their premium : and offered fifty pounds on the same conditions. And, in 1761, they discontinued the advertisement, These premiums were never claimed.

The little success, which appeared to ensue, at that time, from the Society's premiums for the making Italian crapes, occasioned a determination to cease to offer them. And this was thought more expedient from a persuasion, into which they were led, that the proper sort of silk, which was supposed to be the refuse part, was not to be obtained in a quantity, or at such a price, as would admit of the same kind of crapes being made here. But time surmounted these difficulties : and, though this manufacture could not be brought to maturity during the period in which the Society offered their premiums, it has since. The attention to this object, which their advertisements had excited, was not remitted on the discontinuance of their premiums : but was kept up till the end was fully attained. In the beginning of last spring, there were produced, to the Society, some specimens of crapes : which, on examination, by the most able judges, were allowed to be equal to the best imported hither from Italy. The gentleman, who had brought the manufacture of them to this perfection, gave satisfactory assurances, that these specimens were not the product of a speculative experiment ; but, that he had really set on foot a considerable manufactory ; and was enabled to sell the crapes full as cheap as the Italian could be afforded. As this gentleman, whose abilities have made him an alderman of the city of London, at an uncommonly early period of life ; and whose situation, with respect to the silk manufacture, give him every advantage in this pursuit, has advanced so far in the rivalry of the Italian crapes, we cannot doubt, but that he will still improve in this article, to the total exclusion of them. It is further hoped,
that

that he will receive from the Society, the strongest mark of approbation of his having completed one of their earliest views; and from the public, the honour that is due to him for having acquired to this country, whose whole dependance lies on its manufactures, a very considerable new article, at a time when we are losing many others.

The result of the Society's early proceedings, with respect to crapes, has proved two matters, that are well worthy observation. The one is, that we ought not to conclude, with respect to any of the Society's measures, they have been ineffectual, and void of success, because they have not had immediate apparent effects in producing the desired end. The other is, that we should not be ready to receive as principles, to prove the impracticability of establishing any new manufacture, the accounts of little difficulties and impediments, which have deterred particulars from undertaking them. We see, in this instance, and several others which have come before the Society, that time, assiduity, and spirit, surmount the supposed irremovable obstacles: and the public will hereafter find, that the Society's endeavours, in many other particulars, have not been vain, though the fruits of them have not been yet reaped.

The introduction of the MAKING MARBLED PAPER in England, was taken up as an object of the Society's premiums, along with the preceding. This was an article for which we paid very great sums to foreigners: and which had been frequently attempted in England, but without such success, as to supply any considerable part of our demand.

The Society, therefore, offered, in 1759, ten pounds to the person, who should marble the greatest quantity of paper, not less than one ream, equal in goodness to the best foreign imported. A sample, of such paper, to be left with the Society. In 1760, the Society altered their advertisement; and greatly augmented their premium. This year, they proposed to give fifty pounds to the person who should manufacture, in England, the best, and greatest quantity, not less than one hundred reams, of marbled paper: and which was not to be any wise inferior to the best imported from abroad. The next year, 1761, they made an addition to the premium again, by offering twenty-five pounds for fifty reams, preserving the form of the advertisement of the first premium

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of fifty pounds, the same as it was the preceding year. In 1762, the premiums were the same as in 1761: but the advertisement was altered: the Society imagining, upon just grounds, that the quantity of one hundred reams, which they required to be made, was much too large for an experiment: and therefore, reduced their demand to forty reams for the first premium; and twenty for the second. This was their last measure taken for the establishment of the manufacture of this article: for the next year they discontinued the premium for the making marbled paper: the end appearing then to be fully obtained.

In 1760, there was one claim for the premium offered in 1759. But, on inspection of the sample produced to the Society, it was found to be wanting in so many particulars, which were required by the Society in their advertisement, that they deemed it not worthy of the premium. However, in 1763, another claim was made, to which the first premium of fifty pounds was adjudged. It was this claim, that determined the Society to discontinue their premiums for this article. For the specimen was equal, if not superior, to the best foreign marbled paper imported: and it appeared, that the candidate was actually setting on foot a considerable manufactory. The success of this matter, has since been correspondent to the prospect then afforded. For we have now got this article, as far as regards our own consumption, wholly in our own hands; and supply ourselves with paper, of this kind, more elegant and beautiful than the foreign, we before used. The public, therefore, owe to the Society, in this instance, the obtaining a manufacture, that makes a very considerable national saving: much greater, perhaps, than appears probable, without examining the particular facts, that show what the importation formerly was: or the consumption now is.

Among the objects relating to mechanic arts, to which the Society early applied their attention, the procuring the *introduction of Saw-MILLS into use in England*, was one of the most capital. The Dutch, and the northern countries of Europe, have found great account in these machines: many of which are kept at work for the deal and plank sent hither; at the same time that we have been so supine, as to neglect this advantage; and even send wood, purchased in the Baltic, and other parts of the
North

North, to be sawed there, before it was brought to us. It must be allowed to appear an extraordinary fact that, in a country, where great efforts are made to every kind of improvement, and particularly such as depend on machines, this matter should be so long almost totally disregarded; notwithstanding the obvious benefits of it, as well to the public, as the private undertakers of it in proper situations. There were, however, two circumstances, that have contributed to deter those, who might otherwise have been disposed to it, from erecting such mills here. The one is, a strong apprehension, which most people had, that the populace might be incited to a violent opposition against it, under the notion, that it had a tendency to take away the bread of those, who lived by sawing with the hand. The other is, that it was almost universally believed, the erecting such mills was prohibited by act of parliament on the same account; and could not, therefore, be done without a breach of law; and the incurring some penalty. This opinion has long prevailed; and was, perhaps, the principal cause, why so few attempts were made to establish such mills here.

The belief of a legal prohibition of saw-mills was, nevertheless, entirely without foundation, both as to the fact itself or the reason. There never was any such act of parliament: and so far from its being necessary, it is evident, that a prohibition of saw-mills would have been injurious to the public; and no way advantageous to any particular set of men. The far greatest part of the wood, we use, is brought to us from abroad, already sawed: and we pay for the work of it to foreigners. If we had saw-mills of our own, to do such work, we should save that expence; and employ our own people in performing it. The foreign saw-mills, therefore, equally underwork our sawyers, as our own would, if we had such. For this matter is so well understood, that if wood can be brought over cheaper in proportion in that state, than unsawed, it will be brought so. But if we can do this work as cheap ourselves, it will be brought over in the log; and we shall employ our own hands in the work. The sawing cheap here will, moreover, tend to the importation of American timber; as the higher price of labour there prevents them from furnishing boards near so cheap in proportion as they can log.

The Society, influenced by these reasons, thought the matter well worth their regard : and were, at the same time, sensible, that nothing more was requisite to the introduction and establishment of saw-mills, than to remove the errors and prejudices that deterred from such an attempt ; and to procure one or two examples to be set, of the erecting such mills, in order to lead others.

The Society, therefore offered as a premium, to the person, who should first erect a good saw-mill, and work it for one year, one hundred pounds ; and for continuing to work the same the next year, fifty pounds ; as also, twenty-five pounds for each of the succeeding three years he should still go on to keep the mills in use. And at the same time they gave assurances, that the opinion of the illegality of saw-mills was without foundation.

All these premiums were obtained by Mr. James Stansfield, then living in Yorkshire, who had before erected a more imperfect mill : which he pulled down, and made a new one of a good construction : having rendered himself master of it by going to Norway, and Holland, to inspect the best mills to be found there.

The last time Mr. Stansfield came to London, to receive the premium for working his mill, he brought with him a complete working model of a saw-mill ; and offered it to the Society, on such terms as they should think fit. As an encouragement to him to make further improvements, and as a mark of approbation of his assiduity to promote their views, they gave him a gratuity of one hundred pounds : and are now possessors of the model for the assistance of any, who may be desirous to erect a saw-mill.

Application was afterwards made to the Society for a model, in order to its being sent to America : which they determined to procure at their own expence ; and agreed with Mr. Stansfield, to give him fifty pounds for it. In this model, Mr. Stansfield had made an additional improvement : which was a cross cutting saw, for dividing the logs into proper lengths. The Society gave him, on this account, ten pounds more than the sum agreed to be paid to him : and the improvement was added to their former model. The model procured for that purpose, was accordingly sent to America ; and the good effects of it have been acknowledged in the strongest terms, by the governor of one of the colonies, and some other principal

principal persons : who say, great improvements have been made from it in their saw-mills.

With respect to the introduction of the use of saw-mills in England, the Society thus gained the first point, of showing, that such machines were not against law : and of setting an example to others of erecting them, by that which they had thus procured to be wrought in Yorkshire for five years. But these measures had not, however, the immediate full effect in England, either to the public, or to Mr. Stansfield, which might have been hoped for. Having placed his mill in a corner of the country, where there was not an adequate consumption of timber ; and not having fortune sufficient to go into a project of buying log, and sending it, when sawed, to distant places ; he failed of getting sufficient work for his mill : and, having struggled with this difficulty, for two or three years, after he received the last premium of the Society, he determined to go to America, where he might have a better opportunity of availing himself of his knowledge and experience in this matter. The same remoteness from the capital, which made Mr. Stansfield miscarry in his attempt, retarded also the effects of the Society's endeavours to introduce the use of saw-mills, by the example. For, in that distant corner, it had no influence : and this mill remained as much a matter of meer speculation, as those in Holland or other countries.

But, though the Society's efforts had not a speedy effect, they were, nevertheless, in the end, the means of bringing about the desired consequence. For Mr. Stansfield being come to London, with the view, as above-mentioned, of going to America, he was introduced by some respectable members of the Society to Mr. Dingley : who had very great concerns in the importation of timber. The representations of these gentlemen ; the countenance the Society had given to Mr. Stansfield ; and the opinion, their proceedings had impressed on Mr. Dingley, of the utility of saw-mills to the public ; disposed him to treat with Mr. Stansfield. Terms were settled betwixt them : and, Mr. Dingley informing the Society, of his having taken it into consideration to erect a saw-mill at Limehouse, with the assistance of Mr. Stansfield, in case he had their further recommendation and sanction of that measure, they immediately testified their approbation of his design ; and published the following advertisement :

“ Mr. Dingley having proposed to the Society, in consequence of their recommendation of saw-mills, to erect one at Limehouse, for the cheaper and better sawing timber into planks, boards, &c. Resolved, it is the opinion of this Society, That his laudable design may be of great utility to the public, in saving the expence of such sawing, now paid to foreigners ; and in promoting the importation of logs from his majesty’s dominions in America.”

Mr. Dingley then agreed to retain Mr. Stansfield for a term of years ; and to build a complete saw-mill, to be wrought by wind, at Limehouse. This was accordingly finished in December 1767 : at which time Mr. Dingley gave notice to the Society, that he had carried his design into execution ; and desired they would inspect the mill. A committee was accordingly appointed to visit this mill : and it appeared to them, to be erected on the most approved construction, at a very considerable expence. It appeared, also, to be situated with great convenience as to water carriage ; especially when the intended new canal into the Thames shall be finished. It was made to work twenty saws : and the whole was fabricated under the direction of Mr. Stansfield ; and allowed, by very good judges, to be executed in a perfect manner.

The Society, to testify, in the most honourable way, their approbation of Mr. Dingley’s having thus effectually promoted their views in this matter, presented him with their gold medal, with this inscription, *To CHARLES DINGLEY, Esq; for his promoting the views of this Society, by erecting a complete saw-mill at Limehouse.*

The Society have thus at length accomplished their purpose of introducing the use of saw-mills in England. It was brought about by their having first procured, by their premiums, a saw-mill to be erected, and wrought for several years at a distance from London ; and by their having afterwards incited, through their recommendation and sanction, a private gentleman, whose disposition, fortune, and situation peculiarly fitted him to undertake it, to erect another near the metropolis, with the assistance of the person, who had received the Society’s premiums, to the amount of three hundred and ten pounds, and been thence enabled to make himself a perfect master of the subject. For it cannot be doubted, but that Mr. Dingley’s success in this concern, will soon induce others to endeavour to share

share with him the great private advantages of employing a machine, that will save so much expensive labour here. Mr. Dingley's mill has, indeed, at a very riotous period, been damaged by a mob; but a national indemnification, and the punishment of some of the rioters now taken, will doubtless effectually discourage such attempts for the future. The introduction of the use of saw-mills in England, must be, therefore, enumerated among the advantages to the public, which are unquestionably owing to the Society.

The making by the LOOM, PIECES of SILK, COTTON, LINNEN, or WOOLEN, in imitation of the MARSEILLES and INDIA QUILTING, was brought from obscurity, next to oblivion, and nourished into a valuable manufacture by the Society's encouragement. This art of performing, by the loom, these kinds of quilting, in a more elegant, full wrought, durable, and much cheaper method than by the hand, was first invented by persons, who, for want of encouragement, or means to pursue it, had laid aside, and wholly neglected it for several years: and there is the greatest room to believe, that without the intervention of the Society, it would have been intirely lost.

In 1761, a piece of this kind of quilting was produced to the Society: and appearing an ingenious performance, which promised to be of public utility, they had it under their consideration to give a bounty to a person who claimed the merit of the invention. But it happening that this claim of invention was disputed; and that other persons, besides he, who applied, were possess of the art, the Society desisted from giving any bounty; and determined to throw out a general encouragement to the improvement and practice of the art.

They accordingly offered the following premium in 1761.

“ To the person who should produce to the Society,
 “ a quantity of quilting, not less than sixty yards, made
 “ in England, in a loom, in imitation of, and nearest in
 “ goodness to, the Marseilles or India quilting, forty
 “ pounds: and to the person who shall produce, not less
 “ than thirty yards, twenty pounds. The premium to
 “ be determined by the goodness and cheapness, in case
 “ of competition.”

In 1762, alterations were made in the advertisement: and the premium greatly augmented for this article. For

now the Society offered fifty pounds for a quantity, not less than seventy yards in length, and three quarters and an half in width ; thirty pounds for fifty yards ; and twenty pounds for forty yards. A yard of each piece that should gain the premium, to remain the property of the Society. In 1763, the premium was again offered : and the advertisement continued the same. In 1764, the Society proposed the like premiums, under the same restrictions as in the preceding year, for the greatest improvement in quilting in the loom, in imitation of *Marcellles* or *India* quilting, either in silk, cotton, or linen. But they now extended their views further, in bringing this art to the greatest perfection, by an additional premium of one hundred pounds for quilting *woollen* in the loom, after the manner of *Marcellles* or *India* quilting. In 1765, all the premiums for these articles were discontinued.

In consequence of these advertisements, two candidates, in 1762, brought their productions to the Society in claim of the premiums : and they were thought to have such merit, as fully intitled them to the premiums, which were accordingly adjudged to them. In 1763, there was no premium given. But, in 1764, there were three candidates : and they had then carried this manufacture to so great a degree of perfection, that the whole premiums were adjudged to them, in the respective proportions of fifty, thirty, and twenty pounds. In 1765, the premiums were again adjudged to three candidates : one of whom had obtained the first, and another the second premiums of the last year ; and met with the same success this year : the Society having allowed the whole of the premiums. In this year, also, there were three claimants for the premiums for quilting *woollen* ; and they had attained to such excellence, in this first attempt, that the Society gave them the premiums for that article.

These premiums had thus the desired consequences, not only in the multiplicity of the claims ; there being many others besides these we have mentioned to which the premiums were allowed ; but in the improvement which the respective pieces demonstrated to have been made in this art, comparatively with its state when the original specimen was produced to the Society. They, therefore, very properly continued the premiums for these several years, during which time, still more perfect performances were presented in claim : and such as evinced this manufacture
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had received all the aid that could be given in this way. The premiums were, on that account, then discontinued: and the Society must be allowed to have completed, as well as begun, the introduction and improvement of this curious and advantageous use of the loom: which is now applied to several material branches of manufacture, besides the weaving large pieces in imitation of the Marseilles and India quilting, that are superior to them in every quality.

The making what are called CAT-GUT STRINGS *for musical instruments*, was an object the Society very early thought of encouraging by a premium. But while they had the mode under their consideration, they were informed a person had already brought this affair to very great perfection. The Society therefore desisted from offering any premium for this article, till they had examined a specimen that was produced to them for their inspection. They accordingly appointed a time for this business; and the person attending who had manufactured the strings, went through the process of making them before a committee. Several other persons appeared also, who certified they had tried these strings: and that they had found them to be equal in goodness to the foreign strings, and much cheaper, at the price for which they were offered. They further declared, that it would be a matter of the greatest consequence to have such a manufacture established in England; as the people abroad, from whom they imported the strings for musical instruments, supply them frequently with such as are bad; and at an exorbitant price. That, moreover, however trivial this matter might appear at the first view, under the notion, that fiddle-strings were of very little consequence, yet, that in a commercial light this article of trade was of great importance: as it is certain we pay several thousand pounds a year, according to the estimation of some, more than twenty thousand, for strings for musical instruments, that might, as far as appears, be saved to the public, by employing our own people in the work; and using materials of our own produce, that now turn to very little or no account. Upon this information, the Society thought proper to give some encouragement to the person: and accordingly voted her a bounty of six guineas. During the time this matter was under the consideration of the Society, another person petitioned to lay before them some cat-gut manufactured by himself:

declaring also, that he was then carrying on a pretty extensive manufacture of this article. The Society accordingly appointed a time for him to attend them: when it appeared upon various trials of the strings, made by competent judges, that they were not only better than the others, for which the bounty was given; but superior to the foreign. The quickness of the process was, also, an additional merit. Indeed so expeditious was it, that the candidate, in the presence of the committee, in less than three hours time, prepared, from the raw guts, several strings fit to be strung on a fiddle; and played on immediately. The strings appeared good also; as they had no other fault than being somewhat rough when played on: which was imputed only to their newness. In other respects, they were declared to be equal to the best Roman strings. The Society, therefore, upon the repeated declarations of various people of the goodness of these strings, gave the manufacturer of them a bounty of six guineas. The first person afterwards made another application: declaring the pretensions of a further improvement: and that the strings now made by her method, were equal to the best, called the Roman. But, on a trial, before a committee, by a musician, the contrary appeared: and the strings broke on being tensely stretched, and played upon. No further bounty was, therefore, given to this person: nor any other measures ever taken by the Society respecting the matter.

The procuring perfect cat-gut strings, for musical instruments, to be made at home, to the total exclusion of the foreign, was, nevertheless, certainly a matter of consequence; and worthy the Society's notice, at the time they took it under their encouragement. But, it is now become of more importance: as the demand for such strings is much greater, and the price of the foreign exorbitantly raised, at the same time they are sent over much worse in quality. It would be, therefore, beneficial to the public, in a commercial light, to gain this article: and even for the improvement of music with us, which is not less a *polite* or *liberal art* than painting, it were to be wished we should attain to perfection in the manufacture of cat-gut strings. There is not the least doubt of the practicability of it, if proper methods were to be pursued. Because the Italian strings are made of the guts of sheep; which, it is obvious, are to be obtained at the smallest expence, in any required

required quantity. The knowledge of the art only seems wanting: and, that might be easily obtained at Naples, where the best strings are made: and called here by the name of Roman. It is probable this mistake, in the name, arose from their being first brought to us from Rome, though that place is itself supplied at this time from Naples. The Society's views might, by this means, be complicated; though they have failed, in some degree hitherto, from the want of more accurate knowledge in the persons who attempted this manufacture. One of the candidates used lambs guts twisted together, instead of a single gut of greater thickness; in consequence of which, the strong, firm, and even texture, found in the best strings, were wanting. As this matter seems yet within the reach of the Society's influence, as well as meriting their further regard, it is hoped, some means will be pursued to incite the giving such information of the manner of making these strings, as best practised at Naples: which is all that can be wanting to the introduction of this manufacture with us.

The improvement of the LOOM for WEAVING STOCKINGS was another matter, which the Society took upon them to encourage. The very great benefits, which this most useful machine, though of modern invention, produced to the British commerce, by saving labour in the manufacture of stockings, at a time when the advanced price of them with us, would have thrown this article into the hands of foreigners, rendered the attempt to bring it to still greater perfection well worthy the regard of the Society. This seemed more peculiarly an object of their consideration: because the construction of this loom was, at that time, complex; and though capable of producing the general effect, yet not exempt from several defects, and inconveniences. The improvement of this machine, therefore, was, in fact, the improvement of a manufacture, not only necessary with respect to our domestic use; but which makes a very considerable article among our exports.

The Society, accordingly, in 1764, advertised, that they would give to the person who should make the greatest improvement in the stocking frame, one hundred pounds. In 1765, they again advertised the same premium. But a construction of a frame, of which the principal merit was simplicity, having obtained the premium,
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the Society now mentioned, that the fineness of the gage of a frame, fit for working silk, would be considered as a part of its merit. In 1766 they discontinued their premium for this machine.

The premium offered in 1764, was claimed in 1765, by several candidates: and gained by one. The Society were of opinion, that his loom was an improvement of the stocking frame then commonly used, for these reasons: that it is much more simple; can be made at about one third of the expence of the common frames; and may be used by young practitioners with more ease and certainty than the common frames.

The next year, there were again several other candidates: and among them one, whose superior merit not only appeared on examination, but was attested by a considerable body of manufacturers in the country; who had set on foot a subscription to reward the inventor concurrently with the Society. The Society, therefore, gave the whole premium to the candidate, with these approbatory resolutions on his pretensions. That the frame has great advantages over the common frame; that it is more durable, lighter, and cheaper; that a man can work in it three or four hours in a day longer than in the common frame; and that it will admit of any degree of fineness in the gage.

The Society have thus a full claim to the merit of having procured, by their premiums, two very great improvements, such indeed as render it complete, of a machine extremely important to the British commerce in its present state. And they still conduce to render the consequences of this improvement more general, by keeping a complete machine of each of these constructions, as models, in their repositories, for the use of those, who may be disposed to have stocking-frames, made on a similar construction for their own service.

The *making POINT LACE, in England*, was, also, an art, which the Society thought to deserve some encouragement. The working the flowers being the principal part of the labour, and performed by the hand, it was imagined, that the introduction of that manufacture would not only be a saving of the money sent abroad for this article; which was at that time considerable; but employ a number of women of middling rank, who at present are supported by their relations, or struggle with difficulties from

from the smallness of their fortunes, and the present great expence of living. The Society was, moreover, particularly induced to lend an attention to this matter, from the application of a milliner, who declared, she had assiduously employed herself to promote this matter, by instructing young gentlewomen to work flowers for point; and taking the produce of their labours, to be wrought into point lace, and disposed of in the course of her trade. The society, therefore, gave her the sum of ten guineas for her information on this head; and as an encouragement to proceed in her design: and they also offered the following premium in 1762.

“ To the persons who should make the flowers of point lace, after the manner of the Brussels; and produce a sufficient number for half a yard of point lace, to be sowed on the paper pattern with the design drawn on it; and which paper pattern must not be less than two inches and an half broad; sixty guineas. The elegance of the pattern, fineness, neatness, and lightness of the work, to determine the preference.” The sixty guineas were to be divided among the candidates, in proportion to their merits: but no candidate was to have more than fifteen guineas. In 1763, the advertisement continued the same. But, in 1764, the Society altered it thus; and offered, “ To the persons who should make the finest pair of men’s ruffles, and frill, complete, in imitation of Brussels point lace, each ruffle not to be less than forty-two inches in length; the breadth, in the widest part, to be no less than two inches and three quarters; and, in the narrowest part, not less than two inches; sixty guineas, to be divided among the candidates, in proportion to their merits. But no candidate to receive more than twenty guineas. The elegance of the pattern, fineness of the ground, clearness of the open work, and lightness of the flowers, to determine the preference.”

In consequence of these advertisements several claims were made on the Society for the premiums on this article. In 1763 there were three candidates, to whom thirty guineas, part of the premium of sixty, were adjudged in the proportions of twelve, ten, and eight guineas. There was, however, another person, who offered her performance to the Society in claim of the premium: to whom though, from the want of conforming to the conditions

ditions specified in the advertisement, the Society could not allow the claim, yet they thought the production to have so great a share of merit, that they gave a bounty of ten guineas. In 1764, there were again three candidates: one of whom had received a premium the year before; and another of them the bounty of ten guineas. Among these, twenty-eight guineas were distributed, in the proportion of fifteen, eight, and five guineas. In 1765, though the premium was then discontinued, a person claimed it in consequence of not being acquainted with that fact. Upon inspection of the lace, it was found to have great merit: and the Society, therefore, gave another bounty of ten guineas.

It is to be feared, however, that these premiums and bounties have not had the proposed effect. For, notwithstanding it has been demonstrated by the various claims, that there are not wanting either taste or hands for making very beautiful point lace in England, yet the tediousness of the work, and the small price paid in proportion for the flowers, by those who are to finish the point and carry it to market, seem insurmountable impediments to the establishing this manufacture in our country; where the great expensiveness of living makes small earnings so inconsiderable, as to be no inducements to industry. The not succeeding in the attempt to introduce the making point lace here, is less to be regretted: as we have lately attained to perfection in making other fine lace; and established an extensive manufacture, more particularly of that kind called *Brussels*, in which great numbers are employed; and many thousand pounds a year gained. The excellence to which this sort of lace has been brought, has occasioned it to supersede in a considerable degree the use of point; and, consequently, rendered the attaining that a less important object. The Society, however, pursued the right and probable means of doing the public a considerable service, whether commercially or politically considered, in endeavouring to gain the manufacture of point.

There was another matter of the same kind, which the Society took under their encouragement. It was the **KNITTING LACE**. This sort of lace has the appearance of that kind called *minionet*, admits of being wrought at a cheap rate, and is extremely durable. The same circumstances of employing women not fit for labour, and consequently, the same motives with relation to the Society, held

held good as to this, as in the case of point lace. But the knit lace could be much sooner dispatched, would afford greater profit to the manufacturer, and might be more easily disposed of than point lace: and of course was much more likely to be practised by numbers.

The Society were first led, in the year 1764, to turn their attention to this matter, in consequence of a specimen produced to them, by a gentlewoman, who declared herself to be the inventor of the art of knitting lace: and as far as appears really was so. This specimen shewed the practicability and excellence of the work. The Society gave the inventor a bounty of ten guineas; and advertised the following premium in 1764.

“ For the greatest quantity of thread lace, not less than
“ six yards in length, and two inches and an half in width,
“ knit with needles, and made by one person; the good-
“ ness, clearness, and fineness of the work, and beauty
“ of the pattern, to determine the preference; thirty
“ guineas, to be divided among the candidates according
“ to their merit: but no candidate to have more than ten
“ guineas.”

The next year, 1765, the advertisement remained the same as in the preceding, except that the Society omitted the clause respecting the candidates being able to receive no more than ten guineas. In 1766 it was discontinued.

In 1765, the premium offered in 1764 was claimed by one candidate; to whom ten guineas was adjudged: and, in 1766, there were three candidates, among whom was the person who gained the premium in 1765: and who also obtained the largest proportion of the division now. Twenty guineas, part of the premium of thirty guineas, was thus distributed among them: twelve guineas to one, and four guineas each, to the other two.

It appears by the claims, that this art was extending itself; and had made as much progress as could be expected from a matter so little known. It depended on the continuance of the Society's advertisements to have established it: and they were dropt rather from an accidental omission, than a deliberate design. It is to be hoped, therefore, they will be renewed: and that the public will have the benefit, through their means, of the introduction of a manufacture suited to employ many women; who might be otherwise in distress, and led thence to immoral resources.

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The Society extended their views to another article of this kind ; which was, indeed, properly speaking, a branch of the last : and in this they had the desired success.

On examination of the knit lace, it appeared, that the same work was applicable to the making WOMENS MITTS ; and that the introduction of it for such use would give an opening to a considerable manufacture. The Society, therefore, offered in 1764, the following premium. “ For the greatest quantity of mitts, made of thread, in “ imitation of lace, and knit with needles, fit for women’s “ wear ; not less than one dozen pair ; each pair to be “ not less than fourteen inches in length, made by one “ person : the goodness, clearness, and fineness of the “ work, and beauty of the pattern to determine the preference : Twenty guineas, to be divided amongst the “ candidates in proportion to their merit : and no candidate to be intitled to more than five guineas.” The next year the same advertisement was offered to the public ; except the leaving out that part, respecting the candidates being separately intitled to no more than five guineas. In 1766, the premium for this article was discontinued.

This premium was never claimed. Most probably from the requiring a dozen pairs at least to be produced : which might be more than any one person had dispatched while they were so young in the art. But the advertisements had, nevertheless, the desired effect, with respect to the object. For there are considerable quantities of such mitts and gloves now knit in different parts : and, as it is a matter that can be any where performed, the making it still more known would be beneficial. It would, therefore, certainly be an expedient measure, if the premium for knitting lace be ever renewed, to join this to it.

The Society, among the other measures, they pursued for the encouragement of manufactures, by the improvement, or introduction of important machines, took upon them the encouragement of erecting a MILL, *or* ENGINE for GRINDING and POLISHING GLASS, MARBLE, *or* IRON PLATES. The manufactures, that depend on the use of ground glass, &c. are very considerable : and, in particular, optical glasses are becoming a very great article of exportation. It was known that this work had been well done in some places, by machines, that made great dispatch : though there were none such then erected near London. And, also, that those mills or engines were capable

pable of great improvement. In order, therefore, to procure, as well the introduction of the use of such machines, as their improvement, the Society offered, in the year 1762, the following premiums. "For the best effectual mill, or engine, to be erected in London, or any where within twelve miles of the Royal Exchange, to perform by horse, wind, or water, the grinding and polishing plate glass; or the brightening or otherwise beneficially ornamenting or manufacturing cast or plate iron, for chimney pieces, jambs, flabs, &c. or for sawing and polishing marble; which shall do, in the completest manner, the greatest quantity of work in the shortest time. Seventy pounds.

"For the second best, fifty pounds.

"And, for the third best, thirty pounds."

Each mill, or engine, was required by the Society to be completed and wrought during three months after the time, each candidate should give notice that his engine was ready for trial.

In 1763, the advertisement was the same. The next year it remained without any alteration: and, in 1765, the premium was discontinued.

In the year 1765 this premium was claimed and allowed for the constructing and working, during the term required, an excellent and curious machine of this kind. And the Society, desirous further to promote the future erections of such others, agreed to pay the candidate, over and above the premium, fifteen pounds for a complete model of the machine. This model was executed in so perfect a manner, that the Society thought fit to add five more; and gave the candidate twenty guineas. This model is in their repository, for the assistance of those, who may hereafter have occasion to construct such a machine. And, in this instance, the Society have procured to the public the improvement, example of the use, and model of a machine, that may be of great consequence to the manufactures of cut or ground glass, iron plates, or marble: and, which machine is also equally applicable to the cutting, grinding, and polishing agate, granate, porphyry, or other stones, on which such operations usually are practised.

The *CLEANING and WHITENING FLAX for making BROWN OSNABURGS*, was thought, likewise, an object proper for the Society's encouragement.

There

There are two kinds of coarse linen called Osnaburgs: the one white, and the other brown. The manufacture of the white, we are perfectly masters of: and supply to our own trade. We should equally command the brown; but that a peculiarity in the colour is required: and the method of producing that colour was not then known to the manufacturers here. The demand for this sort of linnen is very great. As it is the kind used by the negroes in the American colonies, to bind round their middle.

On a proper representation of these facts to the Society, they thought fit to offer, in 1763, the following premiums for the discovery of the method of producing this brown colour in linnen: which was then thought, by persons who had some pretensions to judgment in this matter, to consist in the management of the flax, previous to the spinning.

“ To the person, which shall reveal to the Society,
 “ the cheapest and most effectual method of cleansing, or
 “ whitening the flax for making that kind of British or
 “ Irish linnen, called brown Osnaburgs, one hundred
 “ pounds. This premium was continued the two suc-
 “ ceeding years: and in 1766 it was dropt.

In 1766 there was one candidate for this premium: to whom twenty-five pounds, part of it, were given, in consequence of his having made an advance to what was proposed: though with such waste in the flax, as rendered the method not applicable to the intended purpose, from this loss of materials. This occasioned an opinion, that the operation of bleaching, which produced the particular colour in the brown Osnaburgs, was not performed on the flax, but on the yarn after it was spun, contrary to the information the Society received on this head when the premium was first offered. The advertisements were therefore discontinued on that account. As it is a matter of consequence, as abovementioned, to our linnen manufactures, to gain the article of brown Osnaburgs, it were to be wished, nevertheless, that this matter should be set in a clear light: and that the true method, practised in Germany, whether it be by a peculiar manner of bleaching the flax, or the yarn, should be imparted to all those, who are in proper circumstances to undertake the making that kind of linnen.

The improvement of *Machines for Extracting Water out of Ships*, was another object of the Society's encouragement.

agement by premium. The construction of pumps for common purposes had been carried to great perfection: and the chain pump, in larger vessels at sea, appeared to be the most fit, and efficacious, machine which had been produced. It was apprehended, nevertheless, that some other machine might be invented, which being accommodated to the motion, and other accidents attending ships, would, in particular circumstances, if not in general, be more effectual than the chain pump.

Accordingly, the Society offered, in the year 1763, “to the person, who should produce to them, the best machine, or engine, for extracting water out of ships, to be essentially superior to any now known, or in use, as well for the expedition of work, as for the saving of the labour of men; and in which simplicity, and cheapness would be considered as material parts of its merits, one hundred pounds.” In 1764, an alteration in the advertisement took place. The Society then required proof, to be given to their satisfaction, of the superiority of the pump, by actual experiment on board some ship in the river Thames. The next year and the year following the advertisement continued the same: and in 1767 the premium was dropt.

During the time, these premiums were offered, several claims were made on the Society for them, but none were allowed till one in the year 1767, to which the premium was adjudged. This claimant having obtained the premium, the Society were thence determined to discontinue their offers respecting this article.

There was another matter of a mixt nature, but most properly belonging to the class of mechanical improvements, which the Society have, by various means, endeavoured to promote. This is an attempt to *establish the production of SILK in England*. It has been, till lately, a prevailing notion, that this matter was impracticable here in a commercial view: and that it was much better suited to some of our American colonies. Experience of the fact has since shewn, that it is attended with greater difficulties in our colonies, according to their present state, than was imagined before the trial. And there is reason to hope, that other facts will evince, the same difficulties do not subsist here. If the many former miscarriages be urged, as an argument against this opinion; it may be answered,

that these attempts were not adequate trials: but essays, by persons wholly ignorant of the means of success. For with the awkward improper manner of managing the worms; and still more of winding the silk from the cocoons; it was next to impossible to produce that commodity perfect. The Society, however, adopted very reasonably the opinion of the time, at their first institution; and, deeming the matter impracticable here, turned their views to the encouragement of silk in America: with regard to which we shall below see the particulars of their proceedings, and the result. But, in 1766, a gentleman sent a specimen of raw silk to the Society for their examination: and on the consideration of it, there was no room to doubt, but with a little more judicious management, it would have been perfectly good. In the deliberations on this specimen, it appeared, from unquestionable authority, that the art, as well of managing the worms, as winding off the silk from the cocoons, was now well known here to particulars: that very fine silk had been produced, even in quantities not inconsiderable, by some few; and that all the supposed grounds of the impracticability of producing silk in England, were erroneous opinions. The Society, therefore, presented this gentleman with a set of the apparatus for winding silk: both as an aid to his design; and a mark of their approbation and encouragement to proceed. They, also, instituted premiums for the planting mulberry trees for feeding silk-worms; and for the silk to be obtained from the worms. But as these stand in the present list of premiums, they will come more properly in question in another place; where a demonstration of the peculiar public utility of the introduction of this article, and a particular answer to the reasons brought against the probability of success in the attempts, will be given. In the mean time, a discussion of these points may be found in two letters, signed *Agriola*, which I published in the *Museum Rusticum*, Vol. VI. p. 241,—304. in order to support the Society's views in this matter, when they first adopted the object.

The *making ARTIFICIAL FLOWERS in England*, was one of the latest articles in this division, which the Society have tried to encourage. It may appear, at first sight, a matter of little moment: but it is far otherwise. We pay to Italy and France, for various kinds of such flowers, for bouquets,

bouquets, trimmings, &c. a sum, that would appear almost incredible to those, who are not well informed of the particulars, both of the quantity, and very high price of the finer sort. At the same time, we have great numbers of women unemployed, who, with a moderate application, would easily attain to the art. The floss silk, as it is called, which is the material for the principal kind, is not to be easily had here : but there are various other substances, obtainable in any quantity, that would answer the purpose equally well. The Society, therefore, had very sufficient motives for endeavouring to promote this art here : and in 1767 they offered the following premiums :

“ For specimens of artificial flowers, made in England,
 “ to the best, twenty guineas ; and thirty guineas to be
 “ divided among any other candidates, according to their
 “ merits.”

There were only two candidates for these premiums ; to one of whom two guineas were given ; the performance having little merit. It is much to be regretted that more have not applied themselves to this art : the knowledge of which, as to the mechanical part, lies in a small compass : and the taste, or rather fancy of the mode, on which the value of the flowers principally depends, might be easily acquired by inspection and imitation of the foreign. In order to facilitate this, the publication of instructions for chusing, preparing, colouring, and managing the materials, would be a proper previous step : as the want of this knowledge is the only means of accounting for the supineness of great numbers of women, who labour under difficulties in their circumstances, from trying to get, not only an easy, but even a genteel support, if they attained to any degree of perfection in this art

The Society, also, offered premiums for some other matters, that properly come under the class of improvements of mechanical arts, for which claims were never made. But, as the inefficacy of them was the result of accidental impediments, rather than any impracticability or unfitness in the nature of the object, it may not be improper to touch on them : as the keeping alive the remembrance, or propagating the knowledge of them, may occasion their being hereafter pursued with success.

One of these matters was, the making CLOTH of the STALKS of HOP BINDS. It is well known, that in Sweden, and other parts of the North, they are applied to

this use : though we wholly neglect them. It appeared, therefore, to be a means of saving part of the money sent abroad for hemp or flax ; as well as rendering this branch of clothing cheaper to the common people.

The Society therefore published, in 1760, the following advertisement of a premium :

“ A strong cloth being prepared in Sweden, from hop stalks or binds, the Society will give a premium of fifty pounds for the best and greatest quantity of such cloth, not less than one hundred, and twenty-five ells, made in England and produced to the Society in December 1761 ; and

“ For the second best and greatest quantity, twenty-five pounds.”

The following direction, for the management of the hop binds, was subjoined to the advertisement.

“ The hop stalks or binds are to be collected in Autumn, put into water, and covered therewith the whole winter. In March they are to be taken out, dried in a stove, and dressed as flax. The prepared filaments will be fine, soft, and white, and may be spun and woven into cloth.

“ Hop stalks require a longer time to rot than flax ; and if not compleatly macerated, the woody part will not separate, nor the cloth prove white or fine.”

The next year the advertisement was continued the same. But in 1762 it was altered.

The Society then proposed “ to give to the person who should make and produce the best cloth, not less than twenty ells, made from the fibres of hop binds, thirty pounds.

“ For the second best, not less than fifteen ells, twenty pounds.

“ And for the third best, not less than ten ells, ten pounds.

“ The cloth to be at least a yard wide.”

The following additional direction was likewise inserted in the advertisement.

“ It not being exactly known, how long time hop binds require to be steeped in water, in order to separate the fibrous parts from the rest, it is recommended to the candidates for these premiums, to examine the hop binds, from time to time, during their steeping in
“ the

“ the water ; and to take them out before the fibres appear to be weakened too much for the use intended.”

The Society, also, this year, in order more effectually to compass their design of establishing a manufacture of this kind of cloth in England, proposed a premium of fifteen pounds in the following manner, for yarn made of the fibres of hop binds. “ For the best yarn made of the fibres of hop binds, not less than twenty pounds weight, ten pounds : for the next best, the same quantity, five pounds.”

These premiums were again offered in 1763 : but in 1764 they were discontinued.

These premiums did not, however, produce any claims. But it is known that several attempts were made. The miscarriages in them, were not owing, nevertheless, to any impracticability in the nature of the thing : because it is done commonly and extensively in Sweden : but merely to the want of more exact knowledge of the time of rotting the hop binds, in order to the making them undergo well the breaking and dressing. It were to be wished, therefore, that the advertisements had been longer continued, and the premium offered for a successful experiment only, and not great quantities. For further trials, or more minute information of the practice in Sweden, must of course have removed the difficulty : and rendered the hop binds, the quantity of which is very considerable, an useful article of produce, though they are now wholly wasted.

It may not be improper to mention here, that *nettle stalks* are treated in Sweden, in the same manner as hop binds : and cloth made of them.

There are many other plants, having strong fibres, which run longitudinally in the stalks or leaves, that are capable, by rotting and dressing, of answering the end of hemp, or flax. Such plants are not produced in England, in great quantities : as ground which is disposed to produce them, being fertile, is in general cleared of them by culture. But in the different countries where we have established colonies, they are found in sufficient quantities. The leaves of some species of the *oak* or *pine apple* tribes, have been treated in this manner ; and produce various kinds of that fibrous substance, called silk grass : of which we shall take more particular notice below. The *apocynum*, and *asclapias* tribes, as well the creeping as the erect, are, also, peculiarly adapted to this purpose : and

in New England, a kind of the *apocynum*, found wild in considerable quantities, has been treated in the manner of flax; and affords what may well pass for middling good: as appears by a sample sent some time ago to the Society, along with specimens of the plant, under the name of *New England flax*. A proper attention to this use of plants, in some of the infant establishments, may be very beneficial, where there is no opportunity of cultivating hemp, or flax.

Among the plants, which promise most to be serviceable in this light; and may be obtained in the greatest plenty, in many parts both of Asia and America; the FRUIT-BEARING PLANTAIN appears to claim the first place. The stem, when rotted, broken, and dressed as hemp or flax, affords coats of fibres of different qualities, that will answer for a great number of purposes, according to the strength or fineness required. The plantain stem is, also, much more easily manageable, as to the freeing the fibrous from the pulpy part; and preparing it for the spinning, than hop binds, nettles, or even hemp and flax themselves. It would, therefore, be of great utility to apply that plant to the several purposes of this kind, to which it is naturally suited: as there are great numbers of plantains raised for the sake of the fruit; of which the stems are at present constantly thrown away as useless. These reasons induced the Society to attempt the introduction of the manufacture of the fibrous part of the plantain. A quantity of the plantain stems being produced, in 1762, to the Society, in various states, to shew the nature and qualities of the fibres, the Society procured some of each kind to be manufactured into those articles, to which they seemed best adapted. Being convinced, by the inspection of these specimens, of the practicability of the respective application, and the perfection of the articles produced, they published the following advertisement of premiums: a member of the Society, who had concerns in the West Indies, engaging at the same time, to send for a considerable quantity of the plantain stems, in order to furnish any manufacturer with them, who should be willing to make trial of them for any of the uses proposed.

“Whereas the stem of the Asiatic and American fruit-bearing Plantain, affords three sorts of fibrous materials: that resemble hemp, hard silk and cotton: all which have been experimentally found capable of
“being

“ being worked into various sorts of manufactures ; and,
 “ among others, into cordage, fustian, lawn, knitting,
 “ gawze, blond lace, and excellent candlewicks : sun-
 “ dry specimens of which manufactures, may be seen
 “ in the hands of the Register of the Society :

“ It is, therefore, proposed to give a premium of
 “ thirty pounds, to the person, or persons, who shall,
 “ on or before the first Tuesday in January 1764, pro-
 “ duce to the Society, the largest quantity, and greatest
 “ variety, of the best and most merchantable commo-
 “ dities, manufactured from the coarser part of the said
 “ fibrous material, resembling hemp.

“ And, also, a premium of sixty pounds, to the person,
 “ or persons, who shall, on or before the said time, pro-
 “ duce to the Society, the largest quantity, and greatest
 “ variety, of the best and most merchantable commodities,
 “ manufactured from the second sort of the said fibrous
 “ material, resembling hard silk.

“ And, also, a premium of forty pounds, to the per-
 “ son, or persons, who shall, on or before the said time,
 “ produce to the Society, the largest quantity, and greatest
 “ variety, of the best and most merchantable commodities,
 “ manufactured from the third sort of the said fibrous
 “ material, resembling cotton.

“ Also, a premium of eighty pounds to the person, or
 “ persons, who shall, on or before the said time, produce
 “ to the Society, the largest quantity, and greatest va-
 “ riety, of the best and most merchantable commodities,
 “ manufactured from the aforesaid materials, by a mix-
 “ ture of two, or all of the beforementioned sorts, either
 “ with one another, or with other materials.”

These premiums were continued to be offered for two
 years after this : and in 1763 they were dropt.

These premiums were never claimed, from a very clear
 reason : which was, that the quantity of plantain stems,
 sent for by the abovementioned gentleman, miscarried :
 whence the manufacturers, not being able to procure the
 materials, could not possibly make any attempt. It is,
 however, to be regretted, that so promising a design was
 so soon given up. For, though it is not likely, that, till
 the materials are more within their reach, this matter
 should strike the manufacturers, so as to set them to work
 to gain the Society's premiums ; yet it seems in the power
 of the Society to go a step further ; and procure the im-

portation of the materials, in a state fit for each of the respective kinds of manufactures. This should not be done, by encouraging the bringing over the crude plantain stem, but the fibrous part, separated after proper maceration : which will be certain of meeting with purchasers ; who will readily apply it to the proper manufactures ; if they can obtain it at a price that may yield them profit. By this means, not only a great part of the freight of the materials will be saved ; but the danger of losing the whole, by such a putrefaction, as would perish the fibrous part, as well as the pulp, will be avoided. This method of proceeding appears the more necessary, since the quantity, promised, as abovementioned, to be procured for the Society, was destroyed by such means, in the bringing over, from its not being then attended to, that quantities of the plantain stem, when put together, in a close place, would putrify. The difficulty of bringing over the crude stems without injury to them, as well as their unnecessary bulk and weight, compared with those of the separated fibrous part, renders the conveying them to Great Britain, in that state, as improper as impracticable. But this very proneness to putrify, which makes the plantain stems unfit for carriage, is an advantage in the rotting, or process for separating the fibres from the pulp, which this plant has over hemp, flax, hop binds, &c. and therefore a favourable quality, where the matter is not to be previously conveyed to great distances, in large quantities.

If, therefore, the Society, by rewards, and proper instruction, could procure the several kinds of the fibrous part of the plantain stems, as materials ready prepared ; that is to say, to be sent over in the same state as hemp or flax ; such materials would find a ready sale, at a price profitable to those who are to manufacture them : and this would induce the proper persons to undertake such manufactures, as might be pointed out to them, in advertisements for small premiums for their so doing. By these means, the Society might complete their views, with respect to this object ; and procure several very considerable improvements in some of our articles of manufacture, by the use of a better or cheaper material for each respective purpose. While, at the same time, a correspondent proportionable return would be made to the colonies for the materials ; with the exclusion of foreign commodities, which are now employed.

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It is in articles of this kind, where want of knowledge and information, in those who are situated to undertake them with advantage, prevents the introduction of useful matters, that the Society can be, and indeed has been in various instances of the greatest public utility.

The rendering more common the art of *making* WATCH FUSEE-CHAINS, was made an object of the Society's premiums. This article was got into foreign hands; though there is not the least reason why we should not supply ourselves, if numbers were to engage in it; and render their work cheap. It is the more desirable we should have this manufacture, because it may be carried on, most properly, by the hands of women. The Society, therefore, endeavoured to procure the teaching of this art, by the following premium, in 1763.

"To the person, who shall have instructed, in the best manner, in any one manufactory, the greatest number of women or girls. not less than six, in making watch fusee chains, thirty pounds.

"N. B. Certificates are to be produced, that the several persons, so taught, do actually gain their livelihood by making such fusee chains, at the time of the claim."

This premium was again offered the next year. In 1767, the Society augmented it to forty pounds; and only required four persons to be instructed: which was also proposed to be gained in 1768.

This premium was never claimed: and, indeed, the sum offered, seems scarcely sufficient to induce any person to set about a matter, that must, of course, be attended with so much trouble: as the collecting together a number of women, or girls, who will apply properly to this matter: and, then, teaching them; and finding them work for practice while they are learning. The object itself is, however, desirable, as well as probably attainable; and worthy the regard of the Society.

The procuring the establishment of *the Manufacture of MILLED CAPS in England*, is one of the later objects of the Society's premiums. This is a matter of very high importance. The French carry on two branches of very great trade, for these caps. The one to the Levant: the other to Canada. They are used by the Asiatics, under their turbants: and by the Canadians, for their warmth, as night caps. They are made at Orleans, and some other places; and afford a very large return.

It is said, on very good authority, that Canada alone, takes off to the amount of between twenty and thirty thousand pounds annually. As this country is now a part of the British dominions, there is no reason why we should not supply these caps from our own manufactures. But, being a matter very little known, it became a very proper concern of the Society's attention. As by the publication of premiums for it; and furnishing specimens, without which it could not be attempted here, they give a fair opportunity to all, who are in proper circumstances, to undertake this manufacture. In pursuance of this view, in 1767, they published the following advertisement.

" For the best specimens of milled caps, manufactured in England, like those manufactured at Orleans, the samples of which are not to be less than six dozen, viz. two of castor, two of Segovia wool, and two of English wool, to be determined in proportion to their merits, thirty guineas.

" Specimens of the proper sorts will be left at the Society's office, for the inspection of such as are willing to be candidates." This premium was again offered in 1768.

This premium has not been claimed: and indeed it may be accounted for. A disappointment having deprived the Society of the specimens that were to have been procured from France, in 1767, according to the advertisement: without which it was impracticable for the manufacturers to attempt the performance. But this difficulty is removed; and the Society are in possession of a complete set of the various sorts; by which any person may be fully informed of the qualities and fashion.

The Society, likewise, gave an encouragement by their sanction or bounties, to several articles respecting the improvement of the mechanic arts, for which they did not advertise any premium.

The CRANE, being a capital machine, and of the greatest use in commerce, and for other economical purposes, several new constructions have been offered to the Society as improvements by the respective inventors. Of these the Society rewarded several by bounties.

In the year 1761, they gave a bounty of twenty guineas, for a new kind of crane, to be wrought by the hand; in which an application had been made of the endless screw. In 1762, they gave another bounty of fifty guineas

guineas to a very ingenious teacher of mechanics, for an improved construction and model of the wheel-crane: and, in 1766, another bounty of ten guineas, for a different improvement, and model of the same kind of machine. In 1767, they, also, gave a gold medal for a very ingenious device, to prevent the mischief that frequently happens from the acceleration of the velocity in letting down great weights, by the wheel crane: which has produced many fatal accidents to the labourers. This mischief may be effectually prevented by that device, through a proper apparatus to check the motion of the wheel, whenever it gains a greater velocity than is desired. The apparatus is made to act, in such case, by means of a pair of bellows, wrought whenever the crane is at work, by the motion of the wheel. The pipe of these bellows is made of such bore, as to discharge the air freely, when the motion of the wheel is of the due degree. But when it gains too great velocity, the interior surface of the bellows, being strongly acted on by the compressed air, which does not then find an adequate vent through the pipe, a part is put in motion, that communicates with the apparatus for stopping the wheel; and immediately throws it into the situation in which it performs such office. This contrivance is not less effectual than ingenious. A model was first produced to the Society: but, to set the matter unquestionably clear, and to induce more readily those, who use wheel cranes, to put in practice this method, the Society determined at their expence, to have a trial of it made at large, by adding the machinery to a real crane: which was accordingly done. The event proved perfectly satisfactory: and the inventor was deemed to deserve well the honour done him by the Society. It does not appear, that this invention has been since applied in practice any where: which can only be imputed to the inattention paid to a matter, that would produce security to the workmen, but no profit to the proprietor of the crane. The Society have, however, done what is due from humanity, in demonstrating, that there is a practicable and certain method of preventing the destruction of a number of men: and it were to be wished, the legislature compelled those, who ought, to carry it into execution.

The Society gave, in 1762, thirty guineas to a person who had invented a machine for PLANEING CAST IRON.

IRON. The construction of this machine was very ingenious; and its operation extraordinary. It planed large iron plates as effectually as a common plane does boards; making curled shavings, and completely smoothing the surface of the plates. This operation is applicable to several material purposes, to save the more tedious one of grinding, in order to obtain a level smooth surface on large iron or copper-plates: particularly for calendars for silk and linnen: or for copper-plates for printing linnen, &c.

The Society, also, in 1762, gave a bounty, of forty pounds, for *an improvement in the SILK REEL*. This just construction of this instrument, so necessary to the establishment of the production of silk, either in Great Britain, or the colonies, was not then well understood here: and the inventor made a very ingenious application of the endless screw, to remedy the principal defect found in other silk reels, which was that of the adhesion of the filaments, by their coming in contact with each other where they should not. This is called *vitriifying*; and was proposed to be effectually provided against by the operation of this machine. The efficacy of it, however, in this light, has been disallowed by very good judges: at least in the mode it was produced to the Society. It has been said to have been improved since; and rendered more perfect. But the Society have procured a reel, with the bason, furnace, and all the apparatus proper for reeling silk, of the construction of those employed in Piedmont: which are allowed to be the most excellent of any in use. These are in their repository, as a model for the use of any, who may have occasion to provide such an apparatus.

The Society, also, gave encouragement to an improved construction of **PAPIN'S DIGESTOR**. This machine is not only of consequence in experimental philosophy; but applicable to various commercial purposes. The improvements of it, in a draught produced to the Society, in 1762, appeared very considerable, and momentous: rendering the machine much less dangerous, and far more commodious in its use; as well as much more accurate, and powerful in its operation. The Society, therefore, had a digester made according to this construction; and, having tried it, gave the inventor a bounty of thirty guineas: retaining the machine in their repository, to serve as a model for the making any, that may be desired; and to this purpose it has accordingly been applied.

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The Society, in the year 1763, gave encouragement to the inventor of a furnace, to answer the end of a *COMB-POT, for the use of wool-combers*. Every improvement in our woollen manufactures ought to be cherished: and this was a very material one, both with respect to the better dispatch of business, and the preservation of the people employed. The use of the comb-pot is to heat the irons in wool-combing: which was before done in an open charcoal fire made in the pot. This was attended with great injury to the health of the people, by the fumes of the charcoal fire; as well as several other inconveniences, and an unnecessary expence in charcoal.

The improvement, for which the Society gave this bounty, was the substituting a small furnace, wherein pit-coal might be burnt. This furnace had a chamber over the fire-place, that admitted of being made hot to the due degree: in which as many irons, as could be required, might be heated to an exact point. By that means, both the destructive fumes of charcoal, and the expence attending the use of it, were avoided: and a more certain and commodious method of heating the iron afforded: by which, moreover, they were kept from being smoaked, or soiled in the heating; or destroyed by the fire in a short time, as they were liable to be, when exposed to the naked action of the burning coals. The Society being satisfied by the examination of the model, and the testimony of persons, who had actually used this kind of furnace at Ipswich; gave the inventor a bounty of thirty guineas, to lay the invention open to the public; and leave the model with them, for the aid of such, as might be desirous to carry this improvement into practice.

The application, which the Society had excited, by their premiums for marbled paper, to improve the ornamenting paper by that and similar methods, occasioned the carrying to great perfection the art of *EMBOSSING PAPER*, with a variety of colours, mixt with gilding. The improver of this art, having attained to a very great excellence, produced in 1764, to the Society, some very beautiful specimens of such embossed paper, superior to any thing of that kind imported from abroad; and gave them, also, satisfactory assurances, that he could afford it at a cheap price: and was very desirous, under their encouragement and sanction, to establish a manufacture of such paper.

The

The Society, accordingly, considering this, as the pursuit of one branch of a capital article of their views, gave the improver of it a bounty of fifty guineas, to assist him in establishing a manufactory : which he, conformably to his engagements, did with great success. The acquisition of this valuable and beautiful manufacture ought, therefore, to be ascribed to the Society ; who, originally, set on foot the trials and experiments, to rival foreigners in marbled and other ornamental paper ; and afterwards, enabled the ingenious improver of this branch to carry his invention effectually into practice.

The invention of a method of *making IRONS in England, for drawing gold, silver, and brass wire*, met, also, with encouragement from the Society. Irons of this kind were before had from abroad. They were very dear : and it was so difficult to obtain such as were perfectly good, that many artizans, who had occasion to draw wire, were very much at a loss to procure them. In 1765, specimens were produced to the Society, of such irons made in England ; which appeared to be good : and they gave the inventor a bounty of ten guineas.

The Society, also, gave bounties to the following mechanical improvements and inventions, of which the particular construction and merits may be more properly explained in another place below : viz. *Improvement of the cyder-mill and press* ; of the copper-plate printing press ;—of wheel-carriages in several ways ;—of the instruments for gaugeing vessels ;—of the compass, and protractor ; of hanging gates and doors ;—of the land quadrant. *Invention of a machine for boring augre-holes* ;—of a machine for raising water by wind ;—of a perambulator, or machine for measuring land ;—of machinery for saving men and goods, in vessels cast away at sea.

On this review of the proceedings, with respect to improvement in the mechanical arts, or the trades dependant on them ; and the result of such proceedings ; it must be allowed, that the public are greatly indebted to the Society. If we consider solely what is already obtained, they appear to have succeeded greatly beyond what could be expected from a voluntary coalition of private persons, unaided by government, either with respect to pecuniary support, or peculiar privileges. But they have, moreover, laid the foundation of many future improvements, by that spirit of application to mechanical pursuits which they have generally

rally diffused ; by the attention they have raised to particular important objects ; and by their collection of models and machines, which will be a constant source of hints and means for future inventions of a new kind ; or for the completing those, where at present only a less advance is made towards perfection.

S E C T. V.

Of Improvements in the Chemical Arts.

THE endeavours of the Society to advance the arts which depend on CHEMICAL PRINCIPLES, are from their nature more confined than those which depend on the mechanical. But it will be found, on examination, that the Society have not been more remiss in this province, than in the others : and that their success has not been less in proportion. There are, perhaps, fewer instances where the premiums of this class have been obtained. But the great end of procuring commercial advantages to the British community has been equally well answered by the collateral means of bounties, or purchases of valuable secrets for the public use. In the investigation of the Society's measures, and their consequences, with respect to the articles of this class, I shall adhere to the same division, as in the preceding ; into those matters where premiums have been offered and obtained ; those where they have been offered and not obtained ; and those where the Society have taken upon them to promote or encourage by bounties or purchases, though no particular rewards have been particularly advertised, or instituted for them.

The *discovery of a mine of COBALT*, that would afford such quantity as might be wanted for the supplying ourselves with zaffre and smalt ; of our own making, was one of first objects relating to chemical arts, which the Society adopted. Zaffre is extracted from cobalt ; and is the matter used for colouring smalt ; which is in fact only the powder of a glass highly tinged with blue, by means of it ; and it is also used as the tinge for other glass and common blue enamels. It appeared, on examination of the custom-house books, that in the year 1753, we imported 207,510 pounds weight of smalt. The Society were informed, also, that there had been a manufacture of it in England ; which had been supplied with
cobalt

cobalt from a mine near Truro in Cornwall : but that this mine was exhausted ; and no other known in Great Britain that could supply its place.

From these circumstances, the Society were induced to advertise a premium in the following manner in 1754. " Cobalt having been already discovered in some parts of the kingdom : For producing specimens, not less than twenty pounds, the best in quality, thirty pounds."

In 1765, there was a claim made from Cornwall for this premium. The Society were then convinced, as well from such claim, as from some further information they had received with respect to this matter, that cobalt was to be obtained in considerable quantities, in many parts of England : and, therefore, they endeavoured to establish, by their premiums, manufactures for making zaffre and smalt from such cobalt as might be procured here. With this intent, they ceased the premium for the producing cobalt ; and substituted, in its room, the following. " For making the most, and best zaffre, not less than five pounds weight ; and smalt, not less than fifteen pounds weight, from English cobalt, thirty pounds." They likewise advertised, that such persons as had the intention of setting about a work of this nature, might have by applying to their Register, ten pounds of English cobalt given them. However, it does not appear, that even this had the desired effect. For they continued to offer premiums for these articles till the year 1761, without their having been ever obtained. In 1762, the Society, still desirous to establish a manufacture of this article, which they had so long attempted with so little success, augmented their premium to fifty pounds. This they, also, offered the year following : and, in 1764, there was a claim for it ; which was allowed. The Society, the same year, and likewise in 1765, proposed one hundred pounds, as a premium for the making zaffre and smalt from cobalt. But in the year 1766, they discontinued it. During the offering these premiums, the Society strove, by every means in their power, to promote the establishment of manufactures of zaffre and smalt. In 1756, they proposed to give a gold medal to the person, who should compose, or write a treatise on cobalt : in which, a minute description of this ore ; where and how it is to be found ; in what manner it is to be tried properly : and the best method of making zaffre and smalt from it : were particularly

larly to be attended to. This premium was claimed by a number of persons, as well foreigners as our own countrymen : but it does not appear the gold medal was granted. The Society were, likewise, at the expence of translating some books on this subject ; but accident delayed the publication : and information, that the manner of making zaffre and smalt was then known to many in England, prevented its being ever done.

The endeavours of the Society have not, hitherto, proved successful, in the discovery of a mine, that may supply cobalt for the making the zaffre and smalt, we consume. But, during the time of their proceedings on this matter, a very considerable manufacture of smalt was established ; and carried on by means of cobalt brought from the Empress queen's dominions ; and imported hither from Trieste.

It is scarcely to be questioned, but that, in the variety of mines, the large tracts of mountains, we have in Great Britain, afford, there must be veins of cobalt, that would answer the views of the Society. But, though it is very usual to find cobalt in bunches, interspersed among other minerals, yet it is very rare to find such a load as will supply a manufacture of zaffre and smalt. Germany alone has hitherto furnished this mineral in perfection : and not only the proprietors of the mines of it, and of the works of zaffre and smalt, but the princes themselves have drawn very great advantages from supplying, almost the whole of those commodities, which has been used in Europe. We might undoubtedly rival them, by the discovery of equally good mines. But this must depend on the chance of what may be found in the research after other minerals, or the operations in the respective mines. For it will scarcely answer, to open mines, with a view to cobalt alone. The making known the utility, and prospect of advantage of it, to those, who are concerned in other mines, was all the Society could propose to do by the advertisements of their premiums : and that being effected already, they have very properly discontinued them.

The *making BUFF-LEATHER in England*, was another of the first articles, that came under this class, which the Society took under their encouragement. We were furnished with that kind of leather, or loth as it is called, for the use of our army, from Holland : and the Society were informed, that the same kind could be produced from

ox hides drest in oil; and, consequently, manufactured here. They, therefore, in the year 1755, proposed this premium. "For the best five hides drest in oil, to answer the purpose of that usually called losh, or buff-leather, fit for the use of the army, ten pounds."

The next year the premium was discontinued.

In consequence of this advertisement, there were two claims: to one of which the premium was allowed.

The specimens produced, appeared on examination, by those who were esteemed the best judges of this leather, to be perfectly good, and fit for the proposed purpose. And the Kentish militia, and some other corps, had their accoutrements made of it. So that the Society undoubtedly carried their point, of shewing that this kind of leather could be manufactured here, as well as abroad; and with profit to the undertaker, provided they could have the orders for serving it where it is demanded. Why the whole has not been since supplied from our manufacture, does not appear. But most probably it has arisen from the manufacturers not keeping up their credit, by making it so good as the foreign: or as that for which the Society gave the premiums.

The *TINNING COPPER and BRASS VESSELS, of a large size, in a perfect manner*, was, likewise, one of the first matters, the Society took on them to encourage by the offer of premiums. In a commercial light, this was not of great consequence. But as the health and lives of numbers of persons depend on the avoiding untinned vessels of copper or brass, or such as are imperfectly tinned, it may be well considered as very momentous. Instead of the original, and proper method of tinning copper with pure tin, a cheap and ineffectual one prevailed in use: by which, the tin, being adulterated with lead, and not being well soldered and made to combine with the copper, but only to adhere in a slight manner to it, is soon worn off; and the surface of the copper exposed to be corroded by many substances heated in the vessels. This produces a poisonous matter, that not only does slow mischief to the health of persons, who eat victuals drest in such vessels, but has occasioned the quick death of many, with the most violent and painful symptoms. The Society, therefore, as well to apprize the public of this mischief, that more general caution may be used, as to induce the artizans to
tin

tin in the genuine manner, published, in 1755, the following advertisement.

“ Whereas large vessels have not been tinned in England: and a bad practice, of tinning small vessels has prevailed; by mixing lead with the tinn: and as it is unwholesome to make use of any copper, or brass vessel which is not tinned: therefore, the Society propose to give ten pounds for tinning, in the best workmanlike manner, the largest vessel containing not less than thirty gallons, with pure, common tin; upon affidavit, to be made by the claimant, that it is done with pure common tin, without lead, or any other alloy whatever.” For this premium there were four candidates; to one of whom it was adjudged. These claims appear to be the first attempt to tin large vessels in England: though it is common in other countries. It might have been hoped this intimation to the public of the expedience of it, and the demonstration of the practicability, would have introduced the practice here.

The Society’s measures had, however, a very good effect; with relation to such vessels as are usually tinned; though the faulty method of performing it is not yet intirely corrected. For many persons are induced to be cautious: and some artizans at all times, and others when particularly required, do tin in a better manner than before. The rest will, it is hoped, as the knowledge of the danger of neglecting it is continually becoming more general, be at last obliged, for the sake of their reputation, and custom, to leave off the mischievous abuses practised in this point.

The *making CRUCIBLES, like the HESSIAN, in England*, was a third article of the Society’s encouragement. These crucibles were all imported from abroad. Though, from the variety of earths and clays, and the perfection we were arrived at in the fabrication of earthen vessels, there was the greatest reason to believe, they might be made in a perfect manner here: and the money paid for them consequently saved to the public.

The Society, therefore, in 1756, declared their intention to promote the introduction of this article, by the following advertisement. “ To the person, who shall make a nest of the largest and best crucibles, of British materials, and equal to the crucibles imported for melting metals and salts; to be produced to the Society; twenty pound.” The next year the premium was

augmented to thirty pounds. It was continued in 1758; but in 1759 an alteration took place in the advertisement, in which the Society declared, that there had been produced to them, in consequence of their premium of the preceding year, crucibles, made of English materials, equal in goodness to the foreign. Therefore, in order to establish a manufacture of such crucibles in England, they proposed, "to give thirty pounds to the person, who should make two hundred and fifty nests of crucibles of different sizes, the largest to hold two quarts." In 1760 the premium was again offered: and in 1761 it was discontinued; the Society believing they had done as much as was in their power to establish a manufacture of this article in England.

In 1759 a claim was made of this premium, and allowed. In 1761 there was one candidate for the premium; to whom also it was adjudged. In 1762 another claim was made on the Society, though they had discontinued their advertisements for this article, through a want of knowledge in the candidate of that fact. But, however, the Society, finding the crucibles that were produced to be so deserving of encouragement, gave a bounty of twenty guineas.

The Society, as we see by the above particulars, pursued the most proper means, and so far succeeded, as to have the future prospect of excluding the use of foreign crucibles in England, by the introduction of those of our manufacture: having actually procured quantities of such as were found perfect to be made. But it does not appear, however, in the result, that the importation of the Hessian crucibles is in any great degree prevented. The reason, why this, and many other similar articles fail of being established in rivalry of the foreign, is, the difficulty, that the manufacturers meet with, as to these kinds of matters, which are not articles of staple trade, in disposing of sufficient quantities of the produce of their manufacture, at an advantageous price. This, when they are persons in narrow circumstances, obliges them to throw up the pursuit: and apply themselves to some more certain branch of business. On the same rock, several undertakings, to introduce manufactures here of articles brought from abroad, have split, after the means, as far as relates to the art, have been completely obtained. It were to be wished, therefore, that when such attempts miscarry,

miscarry, and the undertakers are obliged to give them up, they would reveal their respective inventions or improvements to the Society, for a moderate reward. Because, by that means, the invention being registered there, for the use of any who would carry it into practice, persons in a better situation, and capacity, to go through with the attempt, would in many instances take it up: and establish it, in spite of those difficulties, which were unfurmountable to the first undertakers.

There was another article, of the same kind, of which the Society took up the encouragement later. This was *the making, of British materials, CRUCIBLES, or MELTING POTS, fit for ASSAYING TIN ORES.* The crucibles or pots now used for this purpose are called black lead crucibles or pots; or blue pots: and are brought from abroad. They owe their resistance to heat, in which their peculiar fitness for this purpose principally lies, to their having a considerable quantity of black lead in their composition: and, as our own country is known to afford this fossil, it was presumed, by that, or the discovery of some other composition, which might be substituted, we might procure this manufacture to ourselves.

The Society, consequently, in 1764, proposed "to give fifty pounds to the person, who should make, in England or Wales, five hundred crucibles, or melting pots, of British materials; as fit for the purposes of assaying tin ores as those imported under the name of black lead crucibles, or blue pots." In 1765, the same was again offered: and in 1766 the premium was dropt, in consequence of a claim, made on the Society for this matter. For in 1766, there was one candidate for this premium; to whom the whole of it was adjudged.

The Society succeeded with regard to this kind, as well as the Hessian crucibles, in the obtaining the matter, which was proposed to be done. But the consequence has hitherto been much the same as to both, with respect to the failure of introducing into commercial practice the art discovered. Whether it is owing, in this instance, to the reasons before advanced for miscarriages in similar cases, or whether the candidate was enabled by the premium to make the number of crucibles, by which he gained it, with advantage, though he could not otherwise have afforded them so cheap as the foreign; is not clear from any facts. But the Society, though they have discontinued

nued the premium for this article in express form, are actually promoting the same end, by their premiums now offered for the discovery of black lead, both here and in America. For if that fossil substance could be procured at a cheap rate, the person who obtained the premium for this kind of crucibles would, of course, be enabled to make them to advantage.

There was another article of the Society's encouragement, which has so great an affinity with the making crucibles, that it is proper to mention it here. It is the *making* EARTHEN RETORTS, that would endure a very great heat. Such retorts, it was presumed, would be of material service in many operations: and the Society, therefore, offered, in 1757, "twenty pounds for the best earthen retorts, made of British materials; and equal in goodness to the retorts imported from abroad." In 1758 this premium was again offered: but the next year it was discontinued, in consequence of a claim, that was allowed to be good. The *making* VERDIGRISE in England, was a matter which the Society early set about to procure by their encouragement. The whole, we at that time consumed in the various manufactures to which it is necessary, was then purchased of foreigners, mostly of the French, for our money. The quantity used is very considerable, as a dying drug, on the goodness of which several articles of our most material manufactures depend; and, in the colouring paper hangings, and several other kinds of paintings, in which great stress lies on it. Verdigrise is copper corroded by any vegetable acid. It is made in France, and elsewhere, by rubbing copper-plates over with the marc, or remains of the grapes, after the wine has been pressed out. That material is, indeed, wanting here. But there was just reason to believe, that the marc of apples, the dregs of a malt distillery, or other refuse matter of an acid nature, might be substituted for it, with profit to persons who were well situated to procure such acid on cheap terms.

The making verdigrise, therefore, cheaper, or better; or preventing the necessity of purchasing it abroad, even without any other improvement, were objects very deserving of the Society's regard; and induced them to offer this premium in 1756. "To the person, who shall make the most and best verdigrise, equal in goodness to the French, not less than one hundred pounds weight, twenty

“ twenty pounds.” This premium was again offered the next year. But, in 1758, it was raised to thirty pounds; and that year obtained. It was, however, continued to the year 1762: during which time there were several claims; but they were not allowed. In 1760, the Society pointed out, in a *nota bene* subjoined to the premium for that year, where the process for making verdigrise was to be obtained; and hinted thus at the proper materials here. “ N. B. Verdigrise may be made by
“ moistening with the cheapest and worst sort of cyder,
“ the marc or remains of apples, pears, gooseberries, currants, sloes, crabs, blackberries, or any fruits deprived
“ of their juice by expression, proceeding afterwards by
“ the process mentioned in the *Memoirs of the Royal Academy of Sciences at Paris* for the years 1750 and 1753.” In 1762 the Society, being convinced, that good verdigrise could be made in England, turned their views to the establishment of large works; and raised the premium to fifty pounds: requiring five hundred pounds weight at least. A claim was made of the premium on this footing, and allowed in 1763: and the Society then, to encourage more extensive undertakings, advanced the premium to one hundred pounds, requiring two tons at least to be made. This was also obtained in 1764, by the same candidate, who received the premium the preceding year. In 1764 the advertisements for this premium were discontinued: the end appearing to be fully answered.

The introduction of the preparation of verdigrise in England, seems, therefore, evidently to have received its original, as a matter of discovery, from the Society’s encouragement; and to have been afterwards gradually raised and advanced to its maturity by their care and patronage. Proof is now given to the public, that this commodity can be made equally good as the foreign, of British materials; which may be procured in great quantities. As the resolutions of the Society, in 1763, set forth, on the authority of the best judges, after actual trials of it for the various purposes to which verdigrise is applied, that the specimen, produced in claim of the premium, was even superior to the foreign. The establishment of so considerable a manufactory, which has been carried on for several years, gives just presumption, that this may be done with profit to the undertaker. There is the greatest room to hope, therefore, that the whole of this article, as far

as respects our own consumption, will shortly be gained to ourselves.

The Society, soon after their institution, took upon them the encouraging the *improvement of DYING*. The great consequence of which the beauty, and durability of colour, are to the manufactures, both of *woollen*, *linnen*, and *silk*, renders the art of dying one of the most important of any to our commercial interest: and, under every circumstance, might, therefore, constitute it a very fit object of the Society's premiums. But, with respect to the dying woollen cloths, it was at that time believed, though mistakenly, that, because some of those, manufactured in other countries, appeared of a better scarlet, or black colour; and did actually hold their beauty longer in the wear, they were dyed by better processes; and really excelled ours. The reason of this error, as we have shewn above, consisted in not observing duly the different texture and fabric of the cloths; on which, in fact, the superior appearance and durability of colour in the foreign, solely, depended. This opinion furnished, however, a principal motive to the Society for offering premiums for *dying woollen*. But, allowing it to have no foundation, there were yet other reasons, sufficiently strong, to determine them to turn their attention to this object.

Accordingly, in 1758, the Society offered a premium of twenty pounds, "for the finest jet black, dyed in England, in a piece of superfine broad cloth, superior in colour to any now dyed in England, and nearest to the finest foreign dyed black cloth." This premium was not claimed: and it was discontinued the next year.

The Society, also, in the year 1758, proposed to give a like premium of twenty pounds, for the best scarlet in grain, on the conditions offered for the dying black: and this premium was continued the next year. In 1760 it was augmented to fifty pounds; but, excepting that alteration, the advertisement was the same.

The next year this premium was dropt: from the conviction the Society then received, that our dyes were not inferior to the foreign. But, in 1762, it was renewed under a different form. For now the Society offered fifty pounds, "for the greatest improvement in dying cloth in grain, with respect to quality and cheapness:" and did not specify any particular colour; or comparison with the foreign.

foreign. Thus it was continued every year, till 1766; when it was wholly dropt.

These premiums were never given: and, indeed, the foundation, on which they were originally offered, as appears in the condition of the advertisement, were erroneous; as we have before observed. For the English dyes of black and scarlet were not inferior to the foreign: as the Society were afterwards convinced: but the beauty of the colour of foreign cloths, was, solely, owing to their texture.

The dying flax or cotton, was, at the time the Society first cast their views on the encouragement of improving it, in a state much more remote from perfection than the dying woollen: though it is a matter of the highest consequence to several of our manufactures; particularly those carried on at Manchester, to a very great extent: in which, where stripes of red, yellow, or green are wanted, they have been mostly obliged to intermix woollen with the linnen.

The improving the dyes of *linnen* and *cotton* was, consequently, a very fit object of the Society's encouragement: and, therefore, in 1756, they proposed "to give
" a premium of ten pounds, for the dying flaxen yarn of
" a lasting and firm green colour." They, also, offered, the same year, another premium "of twenty pounds, for
" dying flaxen yarn scarlet in grain, of the best holding,
" and fast colour." Premiums were continued to the year 1759 for these articles: but the sums were augmented for both. The Society then proposed "to give twenty
" pounds, for a sample, of not less than two pounds
" weight, of flaxen yarn, dyed of a lasting and firm green
" colour;" and offered thirty pounds on the former conditions, "for dying flaxen yarn scarlet in grain." In 1760 they still proceeded to offer the same premium for the green colour: but then proposed "to give forty pounds
" for the scarlet in grain." In 1761 they made farther alterations. They this year proposed to give fifty pounds
" for a sample of flaxen yarn dyed of a lasting and firm
" yellow or green colour." The premium for the scarlet in grain remained the same as formerly. In 1762, the premium for dying yarn green or yellow was omitted, and that for dying scarlet in grain was thus changed: "For
" the greatest improvement in dying cotton, scarlet or
" crimson in grain, with respect to quality and cheap-
" nels,

“ nels, fifty pounds.” The next year the premium for the green was thus renewed: “ For the greatest improvement in dying cotton or linnen yarn yellow, forty pounds: and for the same in dying green, twenty pounds.” The premium for the scarlet in grain was continued. In 1764, it was again offered: and the premiums for the dying linnen and cotton yarn green and yellow were continued. The premiums for these three articles were again repeated in 1765. In 1766 the premiums for the dying linnen and cotton yarn scarlet or crimson, were discontinued. But those for dying yarn yellow and green were offered, though for the last time. For in 1767 they were, likewise, discontinued.

The premium for dying cotton and linnen yarn green was claimed in 1766, by one candidate: to whom the Society adjudged it. In 1767 there was one candidate, who claimed and obtained the premiums both of the yellow and green.

From the time of the commencement of these premiums, considerable improvements have been made in the dyes of cotton and linnen yarn: and there is great reason to believe, the Society’s advertisements have been a principal means of incitement to the making them. But it is much to be regretted, that, notwithstanding methods are known for dying thread well of most colours; yet, through the sordidness of dealers, what is commonly found in the shops is exceedingly bad; and with such an imperfect superficial tinge, that it can hardly bear to be drawn, in sewing, through any harder kind of stuff, without losing a great part of the colour.

There was another important article of dying, of which the Society took upon them the encouragement. This was *the dying COTTON of a RED COLOUR*, as practised in the East; and commonly called the *Turky red*. The particular advantages of this kind of dye does not consist so much in the beauty of the colour, as in its being so fixt that it will admit of being boiled in a solution of pearl ash, or any other fixt alkaline salt, without injury to the colour. This firmness of the colour renders the cotton, thus dyed, peculiarly useful in the Manchester or other manufactures, in which stripes of red are interwoven with the white cotton. For the cotton dyed in this manner, being wrought in stripes with unbleached, or, as it is called, grey cotton, will endure the treatment requisite in the

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the cleansing and bleaching cotton, without any damage to the colour. Whereas the red colour of such as is dyed by the common method, is destroyed by being boiled in a solution of pearl ash in water : which is a necessary part of the process of cleansing the grey cotton. A great advantage, therefore, arises from this dye. Because the striped pieces may, by that means, be wrought of grey cotton with the mixture of this red : and one cleansing alone is sufficient to finish them. Though when bleached cotton is used for striped work, as must be the case when cotton dyed in the common manner, or even red worked are employed to avoid the boiling the whole in a solution of pearl ash, there must of course be a second cleansing. This saving, together with some degree of beauty, attending the wear of cotton thus dyed, and which rather improves than is injured by moderate washing in sope, had even induced some manufacturers to procure cotton to be dyed in this manner in Turkey : and the French have a work at Smyrna, where they dye great quantities for the use of their own manufactures. The obtaining this method of dying, in a practicable manner, with respect to expence, appeared, consequently, to be an improvement of great value : and the Society, having been properly apprized of these facts, offered, in the year 1760, the following premium. " For dying cotton yarn of the same " red colour as that which is dyed in Turkey ; and which, " like the Turkey, will keep its colour after many repeated washings ; fifty pounds." The next year it was discontinued, in consequence of the premium's having been adjudged to a candidate. But, in 1762, having reason to believe that the dye, for which they had given this premium, did not answer the end ; and being solicited by some very good judges of the importance of this object, to renew the premium ; the Society proposed " to give one hundred pounds for the greatest improvement in dying cotton, to answer the purposes of Turkey " or India red. They continued to offer this premium till 1764 ; when a claim was made, and allowed : and, supposing they had then gained their purpose, they dropt any further concern with this dye.

It does not appear, notwithstanding the giving these premiums, that this matter has been practicably obtained. The circumstance of the necessity, that the colour should stand the boiling in pearl ash and water, was obscure ;
and

and known only to those, who are particularly acquainted with some branches of the cotton manufactures : and it is to be feared, was not, on sufficient trial, made a test in the determinations in favour of the dyes the premiums were given to : on which the beauty of the colour seems to have had the greatest share of influence. These dyes were not founded on the Eastern process, but improvements of those commonly used for cotton, or in the printing linnen, &c. here. But the Society's premiums, diffusing the knowledge of this matter, did occasion the procuring the real recipe of the dye used at Smyrna : which was obtained from thence by more than one person. Even this has not, however, had the desired effect, of introducing that dye into practice here. For some difficulties, respecting the price, and great consumption of the ingredients employed in the process, have discouraged the use of it, even in the hands of some manufacturers who were best situated to have made advantages of it. There is, nevertheless, great reason, from facts, to believe, that these difficulties will be removed, by the aid of persons better acquainted with the principles of dying; who may, by the substitution of cheaper ingredients, and reforming the process, with respect to the unnecessary or less expedient part of the operation, render the dying this colour advantageously practicable. So that we may enumerate this very important article among those, by which the Society have greatly promoted the commercial interests of Great Britain.

The Society's views, with respect to the improvement of DYING SILK, were confined to grain colours : as we appeared most deficient with respect to them, especially in the scarlet. They, therefore, offered in 1762, " for " the greatest improvement in dying silk in grain, with " respect to quality and cheapness, forty pounds." This premium was advertised the three following years without any alteration : but, in 1766, the Society offered " forty " pounds for the most beautiful and durable scarlet " dyed in silk with cochineal : " which premium was again repeated the next year ; and then dropt. This premium was never gained.

Besides these particular premiums for grain colours in cloth and silk, the improvement of them in any way, or the extension of them to flax or cotton, were thought of so much consequence, that the Society, in 1757, offered

offered a premium for them in general. This was "for the best method of improving grain colours, and rendering them cheaper, ten pounds." In 1758 it was again offered. The next year the advertisement for this article was the same, excepting that the premium was augmented to thirty pounds. In 1760 it was again increased to forty pounds, and continued till 1766: which was the last time it appeared under this general form. For, in 1762, it was dropt with great propriety; being too general and inexplicit to have a proper effect. The Society's proposals ought always to be confined to simple objects; and the conditions clearly specified. Otherwise, where things are brought in competition with others, that are of a different nature. the persons capable of improving any particular article, within the view of the proposed premium, fail to be struck with the offer; or are deterred, by supposing their chance to be small against a variety of other improvements, in different subjects that may be brought. It is, moreover, very difficult to settle the comparative merit of performances, where the subjects are various; and to do justice between the Society and the candidates, where no precise terms of claim are ascertained. The Society's intentions in this premium were, however, still carried on by the particular distinct premiums more properly offered for the improvement in dying grain colours, in woollen cloth, cotton, and silk separately.

The Society took up more lately another subject respecting dying woollen cloth. This was the introducing a new method of DYING BLUE: which was to be done with *materials not at present employed for that purpose*: and indeed on principles different from those of other dyes commonly in use. The observation of the beauty of the pigment called PRUSSIAN BLUE, when well prepared; the cheapness of the materials used in making it; and the probability that the process might be extended to dying; gave room to presume, that a considerable improvement in dying cloth blue, might be made by a due application of the same process: especially as the blue produced from indigo is never bright; and the Saxon blue, which has much the advantage of indigo as to that particular is extremely defective in durability. The Society therefore, to incite proper trials, offered, in the year 1763, the following premium. "For the best spe-

" cimen

“ cimen of woollen cloth, or yarn, dyed on the principle of making Prussian blue, or by any other method not now in common use, fifty pounds.” This premium was continued till 1766 : when it was dropt : having never been claimed.

There was another article, respecting cotton and linnen, which is of the nature of dying, that the Society more lately endeavoured to procure for the public. It is, the discovery of a method of *PRINTING a good and firm YELLOW COLOUR on linnen and cotton*. At present there are no colours in common use, that can be laid on by the plates, and rendered fast at one operation, without the subsequent action of some fluid to fix them. I say, in common use ; because a green has been printed at one particular place. The advantage, however, of such colours, as could be so used, since the introduction of copper-plates for the printing linnen and cotton, appear to be exceedingly great : and the yellow being thought most easily attainable, the Society offered the following premium in 1767. “ For the best fast yellow colour printed on linnen, or calico, at one operation, twenty guineas.”

This premium was not claimed : and is the present year omitted in the Society’s list ; in order to give way to others that have been thought of more importance.

The discovery of a method for *the EDULCORATION of TRAIN OIL* was, likewise, an early object of the Society’s endeavours at improvements, which depend on the chemical art. Among some other matters recommended to them, by the late Dr. Shaw, who was consulted with respect to proper objects of their premiums, this was one. It was observed, that the very foetid state of the common train oil, rendered it unfit for many purposes, to which it might, otherwise, be applied. The putrid smell of the cheaper kind of such as is burnt in lamps, rendered it very disgusting even when used for that purpose : and it was presumed, this disagreeable quality of fish oil was the principal reason, for its not being employed in wool combing, and many other uses, where the coarse olive oil, commonly called Gallipoli oil, is now employed. The rendering the cheap train oil fit for burning in lamps, without the nuisance of the stink, appeared to have a tendency to keep down the rising price of candles, which was growing a burthen to the poor, and a discouragement to several manufactures :

nufactures : and the supplying oil from our own fisheries, that would supersede the use of olive oil, which we purchase of foreigners, was, necessarily, productive of great national saving. These seemed very weighty reasons for the Society's taking up this matter.

They, accordingly, in the year 1757, published the following advertisement of a premium. " For an effectual method to edulcorate train, or seal oil, for the use not only of the clothiers, soap-boilers, &c. but to answer the ordinary purposes of olive oil, ten pounds." It is to be remarked, that in the case of this premium, as of most others, where the object is the invention of any art, the method was not required by the Society to be revealed. This advertisement was continued in the years 1758, 1759, and 1760, and discontinued in 1761.

It does not appear there was ever any claimant for this premium, except one in the last year, who produced a specimen of oil pretended to be edulcorated ; and of the same oil in its original state. On comparison, it was difficult to say which of them was the worst. For the operation had added an empyreumatic smell to the putrid foetor, which was very little diminished : and the colour was rendered darker, with an opaque appearance. The claim was, therefore, rejected : and the premium then discontinued, as not appearing to answer the end. Indeed there is no reason to wonder, it had not a better effect : considering, it was only ten pounds for a matter, that could scarcely be supposed attainable without a long course of experiments, made at a considerable expence : the utmost, which could be done by filtration through sand, or other substances ; by washing with water ; by ventilating with air ; or by other such simple means ; having been known to have failed to answer the purpose.

But though the Society's endeavours, by the way of premium, to attain this matter did not succeed, yet their having started the notion of the utility and practicability of it, obtained them at length their end in a complete manner. A member of the Society was hence led to make a great number of experiments, and at last discovered a method, by means of boiling heat, and the addition of some cheap ingredients, to render the oil entirely sweet and colourless ; and another method, by means of a slight addition, without heat, to take off a

considerable part of the fætor from very stinking oil. He informed the Society of these circumstances, after the premium was discontinued; and, having sent specimens to them, offered to reveal the two methods for the use of the public, if they would allow him a hundred pounds, as a reimbursement of the expence, he had incurred in bringing this art to that state. The Society received the proposal, and after trials made on the oil in wool-combing, and by other means, readily closed with it. But while this was in agitation, it had been observed, that, though the process, in which heat was employed, purified the oil to a very great degree, and might be of advantage, where a great quantity could be prepared at the same time; yet, requiring a particular apparatus, it was not so well accommodated to the use of oilmen in general. But that, if the slighter method without heat could be improved, so as to render the common train oil, usually called *vicious* oil, as sweet and good as that kind called the *spermaceti* oil, it would be a very great advantage to the public, for the reasons above advanced. The proposer, therefore, again applied to a fresh course of experiments; and having improved this method, so as to make the vicious oil equal in colour, and superior in sweetness to the *spermaceti* oil; and to burn with much less smoke and smell; he offered the discovery of this, likewise, to the Society. The several processes were accordingly revealed: and the oil prepared, examined and tried by a committee: in consequence of which, the Society came to the following resolutions.

“ That the specimens of stinking train oil, subjected
“ to experiment, areedulcorated and purified, through
“ means of the processes, to the degree proposed:
“ that the process with heat may be performed at an
“ expence not exceeding forty shillings per ton, including waste; that the operation is easily practicable:
“ that the Greenland oil, purified by the first process,
“ without heat, is improved for the use of burning:
“ that the proposer has complied with the conditions on
“ which the Society agreed to reimburse him in the sum
“ of one hundred pounds, in consideration of the expence, incurred by him before the first proposal to the
“ Society, and that he is intitled to the same.”

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But some particulars expressing doubts, as to the improved process without heat, because it had been performed in the laboratory of a member ; and the subject " oil not retained, during that time, in the custody of the Society's officers ; it was thought proper to have the process repeated, and the oil kept in the hands of the Register, in their office. On the examination and trial of this second parcel so prepared, the Society came to these further resolutions.

" That the oil which has gone through the process, " being compared with the same oil in a crude state kept " in a vial corked up, is considerably improved in colour and smell, and on burning appears considerably improved both in clearness of light and smell, as well when " burning as upon blowing out the flame : and that it " greatly exceeds the common spermaceti oil in colour " and smell, and being tried in a lamp cast a clearer " and better light, and during the burning exceeded the " same in sweetness of smell."

These three several processes were afterwards published by order of the Society.

The discovery of theedulcoration of train oil was thus not only obtained by the Society, but laid open to the public. With respect to the application of oil so purified to the purposes of wool-combing, it does not yet seem to have made the progress which might have been expected. A considerable apparatus is required, to perform the operation with advantage ; and there is frequently a neglect of such matters as are attended in the beginning with any seeming difficulty. Whence we see, in several other instances, that some time has elapsed before any person, properly situated, has undertaken to carry into actual practice things of a very certain and useful nature. The other processes have been privately used by dealers, who mix the oil,edulcorated by the improved process, without heat with the spermaceti oil, which is even rendered better by it ; or sell it under that denomination. This method of treating oil has, also, been found particularly useful in Rhode Island, and the other places where the blubber, train, and spermaceti are carried from the fisheries, in order to their being separated and prepared for the market. On the whole, these processes have not been hitherto so generally applied to the purposes for which they were intended, as to produce

duce the whole benefit and advantage to the public they are capable of affording. Perhaps in this, as in several other instances, somewhat further may be wanting from the Society, to render effectual what they have done, by reviving and propagating that knowledge of the utility, or information of the means, which are wanting, in such cases, to incline, or enable numbers to attend practically to such novelties.

The improvement of *making white or transparent VARNISH in England*, was also an object of the Society's pursuits. The very increasing demand for varnished work ; as well for carriages, as for hand-waiters, dressing boxes, snuff-boxes, and many other extensive articles, both of home consumption and exportation ; rendered the art of preparing and using varnish, of extreme great consequence. The improvement of it seemed the more necessary, likewise, from our supposed great inferiority in this art to the French, particularly to Martin at Paris, in the exercise of this art. Possibly, there was not so much foundation for this preference, as was generally imagined. There is reason to believe very fine pieces in small work could have been produced here, if the same prices had been given for them. And as to the durability of the varnish in coaches, on which much stress has been laid, more ought to have been ascribed to the very rough state of our streets at that time, compared to those of Paris, than to any other difference. This appeared by the quick destruction of the varnish in coaches brought from France ; that was found to be nearly as soon crackt and spoilt by the jolting and shocks, to which the carriages were exposed on our rough pavement and hilly surface of the streets. There was, nevertheless, sufficient ground to render this a proper matter of the Society's attention ; and they published, in 1757, the following advertisement.

“ The Society will give twenty pounds to the person,
 “ who shall make one gallon at least, of the best,
 “ most transparent, and colourless varnish, equal in
 “ all respects to Martin's at Paris, commonly called
 “ copal varnish. The properties whereof are great
 “ hardness, perfect transparency, without discolouring
 “ any painting it is laid over, being capable of the finest
 “ polish, and not liable to crack.” This premium was
 continued in the same manner for four years. In 1762

it was augmented to thirty pounds : and the next year omitted. But it was offered again in 1764 ; and continued in 1765. In 1766 this premium was dropt.

In 1763, fifteen pounds, part of the premium was adjudged to one of the candidates ; who that year made a claim, and produced some beautiful pieces of work. But the varnish did not stand so well as the French, against which it was tried. Since this the premium has not been obtained.

Continual improvements are making with us in this important art : in the exercise of which, for cheaper articles, we both underwork the French, and exceed them in the durability : as will be seen on the comparison of a common Birmingham *papier mache* snuff box, with a French one of low price. The French pursue the old method of laying a coat of whiting under the varnish : which renders it subject to crack and peel off : especially if any moisture reach the whiting. Our people, who first, at Birmingham, began, with varnishing iron, where clear coating as it is called was not practised, followed the same method, when they proceeded to varnish *papier mache* ; and laid the varnish on the substance itself : which renders the varnish more durable. This will appear on examining the two kinds.

To these improvements in varnishing, the Society's advertisements have much contributed : as they have been the occasion of a very great number of experiments on copal, gum animi, amber, and the other substances, that promise, by their solution in spirit of wine, essential oils, or substantial oils, to afford a fine varnish.

The *making* WHITE ENAMEL in England, was thought, also, a proper object of the Society's encouragement. The increasing demand for this article, by the extension of several manufactures in which it is used, such as those of dial plates, dressing-boxes, snuff-boxes, and other toys ; and the being then under a necessity of having it from abroad ; led the Society to the attempting to introduce the preparation of it here, by means of their premiums. They therefore offered, in 1760, " fifty pounds, for making enamel of British materials, equal in whiteness, and in every other property, " to the Venetian." The advertisements were continued to 1766.

In 1760, there was a claim for this premium :

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though for some reason the Society did not allow it : but gave the candidate a bounty of ten guineas.

Notwithstanding the Society's premiums for white enamel have not been gained : yet very good has been made in England. But the circumstance before assigned, with regard to other similar cases, of the difficulty which is found by persons, who newly make any article, that is not consumed in great quantities, to dispose of it, unless where they are particularly situated, has been hitherto a check to the establishment of any considerable work for making white enamel. The publication of a good process would, therefore, be the most probable means of completing the Society's views, by enabling some person, who had the proper conveniencies, and the opportunity of a due vent, to undertake this matter.

The procuring the discovery of a *substitute, to answer the purposes of BORAX in soldering metals*, was made another object of the Society's premiums. The unsuccessful attempt, that had been before made, as we shall see below, to encourage the discovery of a method of producing borax itself in England ; and the little ground there was to hope for the attaining it ; had occasioned the premiums for that article to be discontinued. But the price of borax, during the last war, having become very high ; and the use of it in several arts and manufactures, where soldering metals is required, being necessary ; the thinking of a substitute for it, with regard to that use, naturally occurred : and, as there appeared no room to conclude such a substitute might not be found out, the Society published the following advertisement in 1762. " For five pounds weight of
" any substance, made of British materials, that will
" answer the uses of borax, in soldering, fifty pounds." This offer was advertised to the year 1767 : at which time it was dropt.

This premium was claimed in 1764 ; but the qualities of the substitute, produced for the claim, not being equal to those of borax, for soldering, the Society did not grant the premium. Though, as there appeared some
" improvement, when this substance was compared with others, which had been tried for that purpose, they allowed ten pounds to the candidate, in the light of
a bounty.

a bounty. The want of farther success from the advertisements, and the fall of the price of borax, disposed the Society to drop this premium along with some others, that had stood incidentally in their lists for several years.

There was another, but less considerable object of discovery than most of the preceding, for which the Society offered premiums. It was the procuring *VARNISHES, or COMPOSITIONS to prevent POLISHED IRON from RUSTING.* Two kinds of such compositions were proposed. The one, a transparent, colourless, varnish, that would hinder the access of air and moisture to the iron; and keep it from rusting, without taking off from the lustre or beauty of the polish. The other, a coat of any kind, that could be spread over the polished part of iron, during the time any other unfinished part was to be wrought, to preserve it from rusting: and which could again be taken off at pleasure: without injury to the polish. As every improvement in manufactures is of some consequence, the Society, finding such varnishes or compositions would have some utility, offered, in the year 1762, "fifty pounds for the first, or transparent kind: "and twenty pounds for the other."

The latter of these premiums was claimed the same year: and the claim allowed. The other was not claimed. The advertisements for both were, however, then discontinued. The one obviously from the end's having been attained. The other, most probably, from some accidental omission.

These were the articles, respecting the improvements dependant on the chemical arts, for which the Society have actually given premiums; or, having advertised premiums, which were not gained, have obtained the end of their views, in a greater or less degree, by bounties or purchase.

There are several others, with regard to which, they have not had the same success, though some of them are important as to their consequences; and feasible as to their practicability. But it is to be hoped, that the information of their utility, and the attention to them incited in the public, will yet in the end have the desired effect. That this information may be still more propagated, and the attention still kept up, I will enumerate them here, with such brief explanations, as may tend to render the

Society's advertisements most effectual to the proposed end

The establishing *works for making SALTPETRE in England*, was one great object of the Society's endeavours. The large consumption of saltpetre, as well in the making gun-powder, as in various uses respecting the most important manufactures and trades ; the being obliged to have all we want from the East-Indies, whence our supply of this commodity is subject to be cut off ; and the example of other countries in Europe, who have succeeded in their attempts to make it in quantities ; afforded reasons for believing this to be a very fit article for their premiums. And the Society, therefore, in the year 1756, proposed, " to give one hundred pounds to the person, or " persons, who should make the best ten thousand pounds " weight of saltpetre, fit for gun-powder, at one manu- " factory, (by some method different from that specified " in Mr. Nightingale's patent, copies whereof were to " be seen at the Society's office) within three years, " from materials the produce of England or Wales ; " one hundred pounds weight thereof to be produced " by way of sample, for proper trials thereon : and for " the next best like quantity, within the same time, " fifty pounds." In 1757, the Society offered, " lest " waiting so long a time as three years, proposed " in the premium of 1756, might discourage an im- " mediate application to the making saltpetre, one hun- " dred pounds to the person, or persons, who should " make the *first* ten thousand pounds weight of " saltpetre, fit for gun-powder, in manner, and on " the terms before described : also, for the *second* like " quantities, by a different person, fifty pounds." In 1758 these last premiums were offered again. " Where- " by an opportunity was afforded to the person, who " should produce the *first* and *best* ten thousand pounds " weight of saltpetre, of obtaining two hundred pounds : " and to some other person, who might produce the " second best, and like quantity, one hundred pounds." Books, in which the process for making saltpetre was to be found, were also pointed out. In 1759, and 1760, these premiums were again repeated : and the three succeeding years, three hundred pounds were, likewise, offered for the same quantities. In 1764, the whole was discontinued.

These premiums were never claimed. For, notwithstanding

standing the specious reason abovementioned, of the instances of other European countries, the production of saltpetre here is commercially impracticable, by any method, or on any principles, hitherto known. There is, indeed, no place where nitre, which is convertible into saltpetre, cannot be produced from earths, that accidentally contain it : as they are found more or less replete with it, in every country ; and such earths may, also, be formed every where, by exposing proper substances, or compositions of substances to the air. But in our country, the price of labour, and the other contingent expences, rise so high, that a very great loss, instead of gain, must accrue to any person who should make a considerable quantity. This was, however, known, at the time the Society instituted this premium, only to the few, who had gained an opportunity to form such a judgment, from observations on facts occurring in more confined attempts, that had been then made and concluded. But it has since been more obviously verified, by the event of an undertaking at that time on foot : where, after the expence of six or seven thousand pounds, the beds of nitre, of which there were a great variety, and some very properly formed, were found, on trials by the most able judges, not to afford so much nitre as would answer the expence of extracting it from the earth ; and converting it to saleable saltpetre. The truth of the assertion, that saltpetre cannot be made here profitably, as in other countries, is, moreover, supported by a farther most unobjectionable evidence, arising from a fact relating to the same works. Before the undertaking was given up by the proprietors, two profest saltpetre-makers, who had practised this art in different places abroad, and had authentic public testimonials of their abilities, were sent for hither, to assist in that work ; or to examine into the practicability of producing nitre with profit here. After making a due search for nitrous earths, and computing the expence of labour, carriage, materials, particularly wood-ashes, or other vegetable alkaline salts, in obtaining the nitre from them ; as also that of artificial beds ; it appeared from their account, that they could not produce marketable saltpetre here, at less than near three shillings per pound : whereas, what is imported by the India company, is mostly sold at, or under a fourth of that price. The event of some other

undertakings to make saltpetre, which were on foot at the same time, has confirmed this observation; and shewn the impracticability of establishing such works here, as are carried on in France, Germany, and some other countries in Europe.

The Society, therefore, finding their premiums ineffectual; and being apprised of these several circumstances, especially of the failure of the attempt abovementioned; in the conducting which, neither money nor skill had been wanting; discontinued with great propriety their advertisements for this article. I thought proper, however, to be more explicit on this subject, that the authority of the Society for the practicability of making saltpetre with advantage here, as deduced from their premiums, and their referring to processes in particular books, might not mislead; nor be used, for the future, as it has been very lately, to induce persons to enter into subscriptions; or join in projects with designing people, to carry on saltpetre works. There has been already more mischief done, in the present times, by errors, or impositions in undertakings respecting this matter, than by any pursuit of a similar kind. I have myself known seven or eight instances: of which, some have had very ruinous consequences to the parties concerned, though they were in happy circumstances at the time they first engaged. With respect to the Society, nevertheless, the object was very great; and the attainment appeared then feasible. They pointed out the most likely means of success; and offered a noble encouragement for the trial. When experience demonstrated, that what was done elsewhere, was not suitable to the circumstances of our country, they rationally gave the matter up.

BORAX, being a saline substance, of great consequence, in the practice of many arts and trades, particularly in soldering metals; and the whole we consume being brought from abroad; it was thought proper by the Society, in the year 1756, to offer the following premium for the discovering, or making it in England.

“BORAX being of great use in all vitrifications, in
 “the fusion of ores, and absolutely necessary in sol-
 “dering; and there being reason to believe it may be
 “discovered or made in England; it is proposed to
 “give, for ten pounds weight of borax, discovered
 “or made in this kingdom, having the properties
 “of that which is imported, twenty-five pounds.”

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The next year this premium was continued the same. But, in 1760, it was augmented to fifty pounds. In 1761, the advertisement was thus altered: "For the greatest quantity not less than twenty-five pounds weight, of tincal, or borax, made in England, or Wales, fifty pounds." This was continued to 1762: and then with great reason dropt: there being, in fact, scarcely a shadow of probability, that the end should be obtained. The tincal, or crude borax, of which the refined or common borax is prepared, is brought from the East Indies. It is a saline substance, artificially produced there from a fossil production; which does not appear to have been hitherto found any where but in one place: though the use of borax has long prevailed, as well in almost every part of Europe, as in Asia. There is very little likelihood, therefore, of the discovering here, what has been vainly sought for in so many other places. For, perhaps, no object of chemical research has been pursued by greater numbers than making borax. But at the time this premium was discontinued, borax being extremely dear, the Society, as has been abovementioned, offered a premium for a substitute to it, that would answer the same purposes in soldering metals: which was a more probable means of obtaining a great part of the end proposed, than by the seeking the discovery of borax itself here.

In the year 1757, the Society thought *the discovery of a mine of BISMUTH*, a proper object of a premium. This mineral, or semi-metal, is used in very large quantities in the practice of several businesses, particularly by plumbers; or where compositions of metals, or solders are wanted. We are at present supplied with what we use of this article from abroad; and it was presumed, that in the variety of minerals afforded by different parts of Great Britain, this might be found. The Society, therefore, offered, in 1757, "Fifteen pounds for the greatest quantity of Bismuth, commonly called Tinglafs, made from minerals, or materials, the produce of England, not less than one ton weight." In 1758, the same sum was offered; but only one hundred pounds weight were required. The next year the premium was augmented to thirty pounds: in which way it was continued till 1762: when it was dropt.

This

This premium was never obtained : and, indeed, it must have been the effect of some lucky chance if it had. It cannot be imagined, that thirty pounds, or even the uncertain profits of a production very little understood here, would be a sufficient inducement to sink a mine on purpose. But the utility of bismuth, being pointed out by the advertisement, a research after it might be thence incited among the variety of those minerals, which are laid open in working other mines : and, in that light, the Society have given the public a chance of obtaining this article.

The invention of a *composition for securing SHIPS BOTTOMS FROM WORMS*, was another of the first subjects of the Society's encouragement. The very great injury, which navigation receives from the damage done to vessels by the worms, is too well known, to leave any room for expatiating on it. The high probability, that some substance may be found ; which, being used for paying or covering the bottoms of ships, will prevent the access of the worms, or hinder them from attempting to penetrate ; stands on the same evident grounds. There were, therefore, very cogent motives to influence the Society to take up this matter ; and try, by their premiums, to incite the discovery of such a composition ; or bring it to due test, and public knowledge, if any such had been already found out. They published, consequently, in the year 1757, the following advertisement.

“ As a cheap and effectual composition for securing
 “ ships bottoms from worms, and other injuries, would
 “ be of great advantage to the public, in regard to
 “ the preservation both of merchant ships, and of ships of
 “ war, the Society propose to give for the best and cheapest
 “ composition, which, on sufficient trials, made by
 “ the inventor, should appear most effectual for securing
 “ ships bottoms from worms, and other injuries, to
 “ be produced in 1760, fifty pounds.” In 1758, the
 Society imagining properly, that the inventor might be
 uncertain what trials to make ; or find the making of
 them difficult ; thought fit to take that trouble upon
 themselves : and, accordingly, notified the same, by se-
 veral advertisements. In 1759, they offered a like pre-
 mium for the year 1762. In 1762 they augmented
 the premium to one hundred pounds ; and required
 “ each

“ each candidate to lay, during one year, two planks
 “ one payed or prepared with his composition, the
 “ other unpayed, in a place where worms are
 “ known to be ; and to produce a certificate that the
 “ prepared plank was preserved from the worms, and
 “ that the other was damaged thereby. In which case
 “ the Society would provide planks for each candidate
 “ that should apply for them, which planks were to
 “ be returned payed, or otherwise prepared, in order
 “ for trial.” In 1763, the same was continued. In
 1764, the premium was raised to two hundred pounds,
 on the same conditions. The next year it was again
 offered : and in 1766 it was discontinued.

In consequence of these advertisements, a number of
 candidates lent planks conformably, prepared and unpre-
 pared : and they were disposed of to various ports, where
 the worm was supposed most to abound. But the great-
 est part of them miscarried from the difficulty of main-
 taining a due correspondence, as they passed through se-
 veral hands, respecting the disposal of them and its
 events ; and those, which came back, did not afford any
 satisfactory proof of the efficacy of the remedy. In
 some, that did return, the unpayed planks had not been
 sufficiently damaged, to afford proof of the effects of
 the preparation on the other. These miscarriages in-
 duced the Society, to require a previous testimony of
 the effectual operation of the composition, or substance
 for paying the planks, to be given, in consequence of
 trials made before the application of the candidates to
 the Society. As this would reduce the number of can-
 didates ; and diminish the trouble, as well as perplexity,
 which the Society had experienced in disposing of the
 planks, when there were a multiplicity of claims : and,
 likewise, furnish stronger motives for the trouble, which
 should be taken, from the greater prospect of success.
 But, notwithstanding this, it appears a matter attended
 with so much difficulty, and embarrassment, to determine
 the claims, though, otherwise, from the importance and
 seeming practicability, the object itself would be a very
 fit one of their pursuits, that they have, with very
 just reason, discontinued the offer of any premiums for
 it.

The finding out a *method of preventing the destruction*
 of TURNEPS by the FLY, was another object of the So-
 ciety's

ciety's pursuits of the same date. The great utility of turneps, in feeding cattle, especially in winters, when fodder is scarce, has been before mentioned more than once: and the greatest discouragement to the more general practice of it, as well as cause of failure in those who do undertake it, is, this very injurious accident, to which the growing herbage of turneps, is so frequently exposed. It was, therefore, with respect to the momentous consequences, a very fit object of the Society's views: and, in 1757, they offered the following premium: "For an effectual method to prevent or destroy the fly, which takes the turnep in the leaf, ten pounds." It was again advertised in 1758. The next year the premium for this article was augmented to twenty pounds. And, in 1760, it was discontinued: having been never obtained.

There were, indeed, some claims made for it: but none of them for communications of methods that appeared satisfactory to the Society. The examination of these claims suggested a very good reason, notwithstanding the importance of the subject, for discontinuing the premium. This was the difficulty of deciding on the merits of any proposed methods, which had the specious appearance of being effectual, without going through an extensive course of experiments, that could not be made by the Society, nor with any convenience, under their inspection. But it is still a desirable, and most probably an attainable matter, to discover a method of remedying, at least in a considerable degree, the mischief done to turneps by the fly: and possibly the spirit of pursuing this discovery, which the Society's advertisements have inspired, may, hereafter, be the occasion of it. During the deliberations of the Society's committees on the claims for their premiums, a gentleman of fortune, who attended as a member, mentioned a method, I shall take occasion below to explain, which he asserted to have been found effectual: and which, from speculation, appears extremely plausible. This communication not being made in a formal way to the Society, was not preserved in their papers. But some time after, I described it in a letter, I sent to the *Museum Rusticum*, mentioned above, on the Society's proceeding with respect to this subject,
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the marking sheep, and the catching rats, inserted vol. I. p. 385 : where a particular account of the other methods proposed or practised for preventing the fly, will, also, be found.

The discovery of a *method to prevent or cure the ROT in SHEEP*, was, likewise, made an object of the Society's premiums, nearly at the same time as the preceding. The great damage sustained by the public, as well as private people, from the mischievous consequences of this disease in sheep, renders it a matter of the most momentous consideration : and no conclusive argument can be advanced, why a remedy may not be applied to this evil. The Society, therefore, in the year 1757, proposed to give ten pounds, " for an effectual method to prevent or cure the rot in sheep : " and continued it to 1758. The next year they augmented the premium to twenty pounds : and in 1760, it was discontinued.

There were several candidates for these premiums ; but they did not appear to make out satisfactory claims. In the decisions of them, however, the same objection occurred against the continuance of the premiums for this, as in the case of the preceding article. That is, the difficulty of determining on the merits of any methods proposed, either comparatively, with each other, or absolutely, without actual experiments ; and the incapacity of the Society to make such experiments ; or even to gain accounts of them duly authenticated, when made by others. The matter was otherwise sufficiently important, and worthy the attention of the Society : and the influence of their advertisements may possibly conduce to the completion of it hereafter.

The Society, likewise, in the year 1758, proposed a premium for *the DISCOVERING a VEIN of the fossil substance, called BLACK CHALK*. This substance is very generally used for drawing ; at present wholly had from abroad ; and not frequently to be obtained good. For these reasons, a premium of twenty pounds was offered " to any person, who should produce a specimen of " black chalk, equal in goodness to what is imported " from abroad, taken from a mine in England, that " could be wrought." This was discontinued in 1759.

It does not appear, that any claim was ever made for

this premium. But it is not improbable, that a vein of good black chalk may hereafter be discovered here, and brought into use, in consequence of the intimation given by the Society of its utility. It is in that light the premiums of the Society must be presumed to operate, with regard to the discovery of valuable fossils. For the actual rewards offered are so trivial, compared to the advantages which would accrue to the proprietors of the respective mines, or veins of fossils, that they can scarcely be considered as additional inducements. It is, therefore, principally to diffuse the information of the utility of such matters, and awaken a due spirit of research after them, these premiums have been instituted: and, by keeping up the remembrance of them, the end may be obtained through their means, ever long after they have been discontinued.

The discovery of a *composition for marking SHEEP, without injuring the wool, as is done by pitch, which is almost generally used*, was one of the early objects of the Society's encouragement. They were then induced to offer a premium on this score, because pitch, which is now used on account of its cheapness, the facility of its being laid on the wool, and its durability as a mark, is not to be again taken out of the wool, by washing with hot water and sope, nor any other methods used in cleansing wool: and, consequently, spoils not only the wool of the part where the marks are made, but, also, that of any other parts which come in contact with it, while the pitch is softened by heat. This occasions the destruction, as it is said, of, at least, an eighth part of the whole wool of those sheep that are marked with it; the loss of which to the public has been, on the most moderate computation, deemed 40,000 l. annually, and by some, a much greater, even 200,000 l. Hence a remedy for this evil becomes a very considerable object with respect to the public interest: and a very fit one of the Society's premiums. There can be no doubt, but that a composition of cheap substances may be found out, which will have the properties required for this purpose; that is to say, be a durable mark, and yet capable of being washed out with hot water and sope; and if the Society, by their encouragement, had procured the discovery of such, it is presumed, farmers,
and

and other proprietors of sheep, would readily use it. Moreover, it might probably be the means of a legal prohibition of the marking with pitch: which has not hitherto taken place, in consequence of applications, that have been made on that account, because nothing is at present generally known, which would supply its place for this use; and the want of durable marks would produce much perplexity and trouble to those, who are owners of great numbers of sheep.

However trivial, therefore, a premium for improvement in sheep-marking, may seem, at first view, to those who are not apprized of these circumstances, it was certainly one of the most judicious and momentous premiums the Society ever offered: though it has not hitherto had the desired effect. The Society therefore, in 1758, advertised, that they would give “twenty pounds, for the discovery of any cheap composition, of a very strong and lasting colour, for marking sheep, which will endure and bear the weather a proper time; and not damage the wool, as pitch, tar, &c.” The next year this premium was continued. But, in 1760, it was omitted. However, in 1761, it was augmented to fifty pounds; and again offered. The next year this premium was suspended, on account of taking time for the report of a trial, then making on the sheep themselves, of a composition, which had been sent to the Society by a candidate; and which had undergone some operations, with a promising appearance. The matter has not been, however, resumed: though that composition was rejected from the event of the trial.

There have been many candidates for these premiums; and the Society have proceeded with great caution and propriety in their determination on their claims. They at first tried the compositions, only by exposing them, for a proper time, to the weather; but, finding this not a sufficient test, they since tried them on the sheep themselves. This occasioned the suspension of the premium above-mentioned. But as the society’s intentions have not been hitherto answered; and the matter is of great consequence, and of a practicable nature; it were to be wished, they should not give it up.

The Society, likewise, turned their attention to the establishing the *preparation of SAL AMMONIAC in England.*

gland. It is a commodity, of which a considerable quantity is used in medicine, and in the practice of various arts and trades : and which, at that time, was not made in Great Britain, at most not in any material quantity. There had, indeed, been many attempts to it ; and several considerable works had been established. But some of them, from the defect of the kind produced, and others, from the failure of due profit in the returns, had been then discontinued.

This was, therefore, a very proper object of the Society's encouragement : and they published, in 1759, the following advertisement.

“ Sal ammoniac being necessary in medicine, and many branches of trade, great quantities of it are imported, though it may be certainly prepared in England ; therefore it is proposed, to give a premium of thirty pounds to the manufacturer, who shall make the greatest quantity of the best sal ammoniac, equal in goodness to the best imported, not less than five hundred weight, at one manufactory : fifty pounds weight of which is to be produced as a sample.”

In 1760, the premium was augmented to fifty pounds ; and was continued to the year 1763, without any material alteration in the advertisement. But, in 1763, it was proposed to give, on the same general terms, “ one hundred pounds, to the person, who should make the greatest quantity of sal ammoniac, not less than two tons, equal in goodness to the best foreign imported.” It stood thus to 1767 ; but is omitted in the premium book of the present year.

These premiums were never obtained. Though, while the Society was advertising them, the establishment of the preparation of sal ammoniac, in Great Britain, was continually gaining ground ; and is at length completed : as there are now several considerable works on foot. During the time the fifty pounds were offered by the Society, for the greatest quantity, not less than five hundred weight, specimens were produced to them, of such, as was perfectly good. And there were more than one work set up in Scotland, that made quantities, which would have gained the premium, had it been extended thither. The Society, therefore, raised the reward to one hundred pounds, and the quantity to two tons with a view

view to encourage larger undertakings. This was claimed: the quantity of two tons being alledged by the candidate to be made; and the sal ammoniac sent to the Society as a specimen, found, on full trial, to be good. But the claimants having failed to comply, in other respects with the conditions of the advertisement, the premium could not be given. There are, moreover, several other works in Great Britain: one at least, of which has made more than the quantity required to gain the premium: but it does not appear, why the proprietors declined any claim of it. This article, therefore, is now obtained, to the full intent of the Society's views: and the advertisements of their premiums, though, from some circumstantial deficiency in the candidates claims, the premiums themselves have never been allowed, have had sufficient influence to incite the pursuits, which have led to this success.

The discovery of an *effectual method of destroying RATS, by taking them alive*, was, also, made an object of the Society's premiums, at nearly the same period. The catching rats may seem, at first, a trifling concern; and below the notice of the Society: but it will by no means appear so, on more mature consideration of facts. if we reflect on the damage which the public suffers from the depredations of these rapacious animals, we shall see, that the increase of them is one of the greatest evils of that kind which can befall us: and yet not only such increase prevails at present; but the introduction of a new species of whom of late years, much larger, more voracious from their size, and more difficult to be destroyed, from their being in some degree of an amphibious nature, and breeding in drains or water courses, renders these noxious creatures yet more formidable. The damage, which the public sustains, by the loss of corn only, from rats, is computed at some hundred thousand pounds a year: beside that incurred by their devouring or injuring other commodities: and the very disagreeable domestic annoyance of them where they abound. These circumstances certainly constitute the finding a remedy for this evil, a matter of the highest concern: and the Society had ground to believe, their premiums might be the means of procuring such a remedy. It was very well known, there were persons, who made a profession of destroying rats, that could, in a short time free, to a great degree,

or wholly, any place from them, by taking them alive: and it was a prevailing notion, that this was done by means of some *preparation*, which allured them to come together; and had such influence on them, that they might be easily caught while under its operation. The Society, therefore, at the earnest solicitation of many members, and particularly several persons of great quality and character, formed a view of inducing some person possessor of the secret, to lay it open to them, for the use of the public: concluding, that being masters of it, any persons whose graneries, houses, &c. were infested with rats, might easily free themselves from them without the necessity of employing profess rat catchers. Accordingly, in 1760, they advertised the following premium. "The Baltic rat, having of late years greatly increased, so as, in many places, and especially on board of ships, to be very detrimental; and the destroying them by arsenic, being sometimes attended with great mischief; a premium of fifty pounds will be given to the person, who shall discover to the Society, the most effectual method of taking them alive, in order for the more securely destroying them. A specimen of the preparation is to be communicated to the Society, in order for them to form some judgment of its value, and ascertain its effects." The next year this premium was dropt.

There were a number of claimants for this premium. But, from some unlucky mistake of the intention of the Society, they sent traps instead of an account of such a preparation, for alluring and intoxicating, or fascinating them, as it was believed was used by the profess rat-catchers. This was the case of all except one, who only described a method, very far short, even in pretensions, of what was intended to be required. The Society were, therefore, of opinion, that they had no claim to the premium: as not having in the least produced what was required: and the advertisement not appearing to have any effect on the persons, whom it was intended to influence, it was discontinued. There are, indeed, two strong reasons why it did not succeed. The one was, that the sum offered is not a sufficient consideration for a man to lay open the secret of a business, by which he gets his livelihood. The other was, that, on a discussion of the matter to determine the claims, it appeared, from

a considerable field of information, which was then obtained, the profest rat-catchers did not accomplish the destruction of the rats, or take them, by the simple use of any one composition or substance; but by the practice of various means to allure, and bring the whole number of rats together; and then to kill, or intrap them in: the performing of which, the same acquired skill and dexterity were necessary, as in the practice of other similar arts. The Society, therefore, discontinued the premium: as not likely, at least in that form, to answer the proposed end, of procuring a discovery of the art of the profest rat-catchers from any of themselves. The examination of the claims did, however, occasion many gentlemen, who had obtained knowledge from the rat-catchers, to communicate what they had observed or gained; the substance of which, together with a more particular account of the Society's proceedings, with respect to this article, the preventing the fly in turneps, and the marking sheep, I imparted to the public, in a letter published, as before mentioned, in the *Museum Rusticum*, vol. I. p. 383. The endeavours of the Society, with relation to this article, have, consequently, not been without some effect: and they have incited a design to serve the public still further in this matter, by other means, that are now in agitation.

The *purifying* ONYXES and CORNELIANS, was, also, made an object of the Society's premiums in the chemical class. It had been observed, that the onyxes and cornelians, obtained here at present, were much more cloudy, in general, than those transmitted to us from the ancients, among their engraven gems. This gave rise to a notion, that the ancients were posses of a method of purifying, and rendering them clear: and an eminent German engraver of gems, at that time in England, maintained the same opinion. The Society, therefore, at the solicitation of some members, who were zealous supporters of the polite arts, offered the following premium, in 1760. " There
" being great reason to believe, that a method may be
" discovered of purifying cloudy onyxes and cornelians,
" it is proposed to give to any Person, who shall discover
" a method for that purpose, and shall produce three
" onyxes, and three cornelians, whose shortest diameter shall
" not be less than half an inch, the stones to be seen, ap-
" proved of, and marked by the Society, before the ope-
" ration, twenty pounds. It is expected that the stones,

“ be not injured by the operation, in any respect ; and
“ that the stones, to which the premium is adjudged, re-
“ main with the Society one month after the determina-
“ tion.” In 1761, the premium was augmented to thirty pounds : and only two stones of each kind was required to be produced. In 1762, it was further increased to fifty pounds : in which manner it was continued to 1765 ; when it was dropt.

Though this premium was advertised for so long a time, it was never claimed : nor any application to become a candidate made, even by any pretender to such an art : and there is the greatest reason to believe, the same would have happened, had it continued much longer. For, notwithstanding the opinion of the German artist, and others, nothing can be more improbable, than that taking away the clouds from the gems should be practicable. The clearness of the antique onyxes and cornelians, on which all the presumption rested, that such a method had been formerly practised, may be obviously accounted for, without any suspicion of their being rendered so by art. It is well known, that the oriental stones, of this kind are, at present, much clearer than those obtained by us in Europe for common purposes. And, as there are grounds to believe, they were plentiful with the Greeks and Romans, it is reasonable to suppose, the ablest artist among them, whose works only are in general transmitted to us, selected such as were clear. This is a sufficient answer to that argument for this opinion. But, when we consider, that the foulness is owing, either to heterogeneous particles intermixt with the proper matter of the stones, or to imperfect crystallization ; on what principal can we imagine, a change may be made throughout the whole substance of the stone in its solid and intire state : and the fluxing it would entirely change the texture, and indeed the nature of the stone, by rendering it vitreous. Such an art, moreover, were it attainable, would not require the incitement of the Society's premiums for its discovery. Since the same principals would certainly extend to diamonds, and other gems of high price : the removing clouds from which would be the most advantageous operation, next to making them, or gold, that could possibly be practised. The Society, on reconsideration of this matter, having sufficiently indulged the gentlemen who proposed it ; and who well merit-
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ed this mark of their deference; have now dropt the premium.

The *making LEAF METAL and BRONZE in England*, was thought also, a fit object of the Society's encouragement. They are not articles of very great return in trade: but as a quantity not wholly inconsiderable is used, and purchased of foreigners; and there appears no reason why it might not be made here; the Society were induced to offer some encouragement for a trial. In 1761 they advertised the following premiums: "For the greatest quantity of leaf metal and bronze, equal to that imported, not less than three thousand packets of each, to be made at one manufactory in England or Wales, fifty pounds." The Society very properly judged, that the quantity they required was much too large to be produced in the infancy of a manufacture of this kind; and, therefore, offered, the same year, another premium of twenty-five pounds, "for the greatest quantity of leaf metal and bronze, equal to that imported, not less than one thousand five hundred packets of each, made at one manufactory in England or Wales." The next year, they continued to offer fifty pounds as a first, and twenty-five pounds as a second premium. In 1763, finding these measures fail, they reduced the sums and quantity; and proposed to give twenty pounds for not less than five hundred packets of each; and ten pounds for not less than three hundred packets. In 1764, they again raised the sum to fifty, and twenty-five pounds; and required only the same quantity to be produced as in the advertisement of the last year. In 1765, these premiums were dropt: no candidates having ever presented themselves.

Whether the price of labour here does not admit of these articles being made so cheaply as abroad, or whether no person, in proper circumstances to undertake this matter, had a disposition to it, does not appear: but the Society, tried, by the most fair offers, to furnish motives for an attempt: in which the premiums, if obtained, would have been a sufficient indemnification against any loss, that might have been otherwise incurred.

The *discovery of a method of making good PIG or CATS IRON, with COAK; and of converting PIG IRON, so made, into good BAR IRON*; was another object of the Society's premiums. The attainment of the matter

proposed would be of the greatest consequence to our hardware manufactures; and make a very great saving of the money, we now pay to Sweden for iron, where a superior kind is wanted: particularly the whole that is converted to steel. The reason, why we do not produce more perfect iron in our works, is, the scarcity of wood for charcoal, without a great consumption of which, the iron produced at the foundry cannot be purified at the forge, to the standard of the Swedish, by any method at present known. Attempts have been, however, made to substitute coak, or in other words pit-coal charred, for the charcoal of wood: as the cheapness of that species of fuel, if it could be effectually applied to this purpose, would give us the advantage over all foreigners. These attempts have been so far attended with success, as to make a coarser kind of pig iron, fit for some uses: but not to such as is convertible with the quantity of charcoal, that can be allowed, without great loss, into good forged or malleable iron. Much less is it at present known, how to convert pig iron, made with coak, into good bar or forged iron, by means of coak. The matter does not, nevertheless, appear impossible: and the Society were induced, from this view of the facts, to propose the following premiums in 1762: “For making the largest quantity of pig iron, not less than one hundred tons, with coak, equally good with that made with wood charcoal, fit for being manufactured into rough bar iron; and which bar iron may be sold on the same terms as the Swedish; one hundred and fifty pounds.

“For making the greatest quantity, not less than ten tons, of tough bar iron, with coak, from coak, pigs, equal in goodness to that made from pigs smelted by wood charcoal, one hundred and fifty pounds.”

These advertisements were continued without alteration to the year 1766: when they were dropt.

These premiums were never claimed: nor is it likely they ever should, even if they had been kept on foot much longer: as we are very distant from this degree of perfection in the art of producing good malleable iron with coak; or indeed from being possessors of the knowledge of any adequate principles, that lead to it. The Society, therefore, on a revision of the subject, discontinued the advertisements: and with still more reason,
since

since the object was of so much importance to any, who were in a situation to attempt the attaining it, as well as to the public, that the premium could not be supposed to add to the motives for the pursuit. None but the proprietors of considerable works could possibly perform what was required to be done; and they have infinitely greater inducements than the sum offered, to possess themselves of the means, if they were within their reach. Moreover, the notion of this kind of improvement in the production of iron, is at present, so generally diffused, among all, who are engaged in such concerns, that the Society's information of it could not be of equal avail, in this case, as it might in many others, where the matter is of a more obscure nature, and the conception more novel.

The Society, also, set on foot the attempt to *discover* ARCHAL, or, as it is called in their list of premiums, *the ORCHIAL WEED, in England*. This is a moss, brought from the Canaries, and Cape de Verd islands, of great use in dying. The consumption was very considerable: and, at the time of offering the premium, the price was advancing here to a very high rate. The Society, therefore, thought proper, in 1762, to issue the following advertisement, to encourage the research after the herb here.

“To any person, who shall produce to the Society,
“the greatest quantity, not less than one hundred pounds
“weight, of orchilla weed, or moss, such as is brought
“from the Canaries, of the growth of any of his ma-
“jesty's dominions, fit to be manufactured into the ma-
“terial for dying, called archal, the sum of one hun-
“dred pounds.”

“Likewise, for any quantity, not less than fifty
“pounds weight, fifty pounds.”

The advertisements were continued to the year 1765: and then the whole was dropt.

This premium was never regularly claimed: and indeed there seems to be but little probability it should. Since the Society required the finding out the same kind of moss here, as is brought from the Canaries, under the name of archal, or orchilla: which there is reason to believe, is not a species of moss, that grows in these more northern latitudes. The end of the Society was nevertheless, answered by the advertisement. For, though this particular species of moss has not been discovered in England, another which serves in a great

degree for the same purposes, was found out ; and is now brought into use. The public, therefore, owe to the Society, the introduction of an English material, instead of a foreign one, for which we payed annually a very large sum, that is in part saved now : and we may hope will be so entirely in time.

But the research, which the Society have incited after tinging mosses, will most likely have many more beneficial consequences. Great numbers of the species of this kind of vegetable afford dyes ; and, on due trial, such as are very valuable will most probably be found. In the manufacture of plaids in the Highlands of Scotland, which great number of families go completely through, without any exterior assistance, the dying the various colours is performed in the common culinary vessels, by a traditional art, which the people possess in common. It is well known, that some of the principal ingredients, in their dyes, are mosses ; of which the particular species are not known to us : though, probably, from their strength of colour, and fastness, they would afford great improvements to our dying woollen stuffs.

A particular proof of this has already occurred in those parts, in the instance of the CUDBEARE. This is one of the species of the tinging mosses : whether freshly discovered, or whether one of those used in the dying the Highland plaids, I have not been able to discover. But some gentlemen procured it to be collected, and prepared it in the form of a pigment : in which state, it, was successfully produced to sale as a dying drug. Applications were made to the Society, to give a judgment on its merits : and, after repeated cautious trials comparatively with archal, the Society resolved, on the authority of the most able dyers, that tho' it would not answer all the purposes of archal, yet it would for some, even with a superior excellence. This undertaking to make cudbear returned in a short time several thousand pounds : and employed a number of indigent women and children, in collecting the moss, in a part of the country where it was of the greatest benefit. The further examination of mosses, in different parts of Great Britain, therefore, merits great attention : and, though the Society discontinued the advertisements for the premium on finding a large work set on foot of archal prepared from English moss : yet it is hoped, the attention to the subject will

will not be dropt by those, who are qualified properly to make researches of this kind.

The discovery of a *true RED COLOUR for the use of ENAMEL PAINTERS*, was deemed, likewise, a proper object of the Society's encouragement. The red produced from gold is the only bright colour, of that kind, yet known: and it verges too much on the purple for many purposes. It has indeed been said, on good authority, that a fine crimson, and even a teint tending to the vermilion, has been produced by the same means. But this seems to be so much the result of accidental circumstances in the process, that it has been extremely rare. The society, therefore, in consideration of the great utility of a true bright red colour to enamel painters, and of the reason to believe it was attainable, offered the following premium.

“ To the person, who shall make the finest scarlet colour, which will bear repeated and sufficiently strong fires, without change, for the use of enamel painters, the quantity to be produced not less than two ounces; from which a quarter of an ounce will be taken for trials, the remainder to be sealed up and returned to the candidate; fifty pounds.” This premium was advertised the two succeeding years, with this alteration, that the words *true red* were substituted in the room of the word *scarlet*. In 1766, the premium was dropt: and it does not appear to have been ever given.

The Society thought proper, also, to offer encouragement to the establishing a work for making SALT in *England, that would answer the purposes of the foreign BAY SALT*. This kind of salt, called bay-salt, is necessary for curing fish, as well as pickling beef or pork, in some of the methods now in common use: and it is purchased of other countries. It had been demonstrated by the experiments of Dr. Brownrigg, and others, that, by a proper method of preparation, easily practicable, our sea salt might be rendered an effectual substitute. The Society, therefore, in order to engage persons, who might conveniently make quantities of such salt, to undertake it, offered, in the year 1764, the following premium. “ For the greatest quantity of salt not less than twenty tons, made in England or Wales, which will answer the purposes of bay-salt the same being made at one manufactory, not
“ erected

“ erected before the end of the year 1763, one hundred pounds.”

“ For the next greatest quantity, not less than fifteen tons, on the same conditions, fifty pounds.”

“ N. B. The method of making bay salt, and the practicability of doing it to advantage in England, may be seen in Dr. Brownrigg’s treatise on that subject.”

This advertisement was discontinued the next year.

The premium was never claimed: probably from the short time of its continuance. For, in the case of large manufactures, or considerable works of this nature, time is required to the settling and executing a proper plan. The views of the Society have however, been answered in the sequel, in consequence of their having propagated the notion of the advantage of such an undertaking. For a large manufactory is now set on foot in Essex: where, in all probability, the whole demand for our consumption will be supplied; and the expence we before incurred, will be saved to the public.

Besides these improvements in the chemical arts, or the manufactures or trades dependant on them, for which the Society advertised rewards, there were some others, that were voluntary brought before them, which they encouraged in the way of bounty; or procured to be laid open in the way of purchase.

One of these was, the *STAINING of MARBLE, so as to give it the appearance of INLAYING*. The person who applied on this score to the Society, had carried that art to great perfection; and could employ a variety of colours in painting arms, flowers, figures, and other objects. On producing specimens of his performance in the year 1759, a bounty of ten pounds was given to him.

Notwithstanding the Society’s encouragement, and the perfection to which this art has been advanced, there has been but little done in it since; most probably, from the very high price set upon the respective performances in the application of it: which has deterred even some of the most liberal and expensive patrons of works of this kind, from purchasing them freely, as they were otherwise disposed to have done.

The *revealing a method of TANNING with OAKEN SAW-DUST*, which had been lately discovered, was a more important object of the Society’s efforts to promote the commerical interest of Great Britain. The inventor of this method, who was an ingenious mechanic,

chanic, but not in affluent circumstances, offered to lay open his art, for the benefit of the public, if the Society would allow him a consideration for it. They closed with his proposal; and agreed to pay the expences of his coming to, and living in, London, while he tanned proper specimens of the leather, under their inspection; and to give him a hundred pounds, on condition he made good his pretensions in these trials. He accordingly came, and began the experiment; but was taken ill of the small-pox, which occasioned a delay. The Society had, however, the generosity to support him in his illness, at a considerable additional expence: and after his recovery, he completed his process. The Society then, on the authority of several principal members of the leather-dresser's company, who examined the leather tanned with saw-dust only, under the inspection of a committee, resolved, that he was intitled to the hundred pounds according to the agreement.

The Society thus procured to the public, the knowledge, and right, as far as regarded the property of the invention, to practise a much cheaper method of tanning than with bark. But unluckily, this acquisition has not had hitherto its desired effect. There is, unhappily, an old act of parliament, which prohibits the use of any substances for tanning, besides such as are specially enumerated there: and in that list of ingredients, saw-dust has no place. An attempt was, however, made to procure a repeal of this prohibition. But the reasons for the expedience of such a measure, not being well explained, it miscarried. The restraint which this act lays, is certainly, nevertheless, a great check, and injury to a very important branch of trade. And there can be no shadow of argument alledged, why a dear ingredient should be used in tanning, instead of a cheap one, that would answer equally well; except what regards the interest of the proprietors of woods: who might find some disadvantage, in being deprived of the means of disposing of their bark for this purpose. But that is a very trivial consideration, compared to the benefit we may gain, or loss we may suffer, by any improvement or detriment to our trade in leather. This trade was, some time ago, very extensive, both in the manufactured articles, and the intire skins: as we not only supplied our own colonies, but a considerable part of Europe. But
we

we are now losing it in every quarter. The art of tanning is introduced lately into Sweden, by an Englishman: and is practised for the supply of that country: which is thence, according to the prevailing notion there, thus furnished with as good, if not better, than they before obtained of us. A distinguished monarch in Germany, particularly attentive to commercial, as well as military concerns, is establishing the practice of tanning in his dominions, by adopting this very discovery of the use of oaken saw-dust in it. It, therefore, behoves us to authorize and employ every means of tanning in the most perfect and cheap manner, that we may not lose still more of our foreign trade for leather, or the articles made of it. But no legal measures can be taken to keep us on a footing with our rivals, while we are subject to the prohibition of the use of better and cheaper ingredients than bark, or those now tolerated; and of the shortening the times of the leather's remaining in the tan: which is, also, forbid, by another clause in the same act, that directs it to be kept in the tan, six or seven times as long as is necessary, according to some improved processes lately discovered. The dearness of leather for shoes, which is a grievance to the poorer people, calls aloud, also, for the introduction of all those methods, that may render it cheaper. The consequences, therefore, of these improvements, or restraints, are infinitely greater to the community, than the promoting or diminishing the sale of bark: and there is, moreover, a very material reason, on another principle, why that should be discouraged, instead of promoted. The profit arising from it, induces the proprietors to sell timber at that season of the year, which is unfavourable to the strength and durability of the wood: by which means those who have occasion to employ it, are worse served with timber than they otherwise would be, and our buildings greatly injured, by the shrinking and contraction so constantly found where new timber is employed. It is hoped, these reasons will weigh with some public-spirited members, to amend a law, which might, as it now stands, be consistent with the policy of former times, but is greatly repugnant to that of the present. Whenever this is done, the public will receive very great advantages from those improvements in tanning, which the Society's encouragement has produced.

The Society were, also, induced, in the year 1767,

to give a bounty for the *improvement of CRAYONS*. The art of making pastils, or crayons, was by no means brought to the degree of perfection here, of which it admits; and those commonly to be obtained were faulty or defective. On the producing specimens by the candidate for this bounty, to the Society, he informed them that there was no crayons to be purchase, which could be esteemed perfect, except of Mr. Stoopan, of Lausanne in Switzerland: but that he could furnish them with equally good, much cheaper; and would sell a single crayon to any artist who desired it: whereas the others were not to be bought but in sets. His specimens were given to be tried by some able crayon painters; and were reported to be equal, if not superior, to the best foreign. The Society, therefore, gave him a bounty of ten guineas.

Notwithstanding this, and other private improvements of crayons, it is yet difficult to procure such as are good: and, indeed, the same may be said of all the finer pigments or colours used in painting. This is principally owing to the ignorance, or fardidness of dealers in these articles, who sometimes do not know how to judge of them, but more frequently rejected such as are more perfect, for the sake of cheaper; whence the preparation of fine colours has been thrown into the hands of Jews, and the most illiterate low people; by which means, the art of making them is much depraved, comparatively to what it was formerly. It would be, therefore, greatly for the interest of painting, now carried to a great height of excellence in our country, as to other points, that a manufactory of fine colours, &c. should be established, under the direction of some person of judgment and honour, on which, artists might depend on being supplied with such colours as were perfect in their respective kinds, either through the hands of colourmen; or if they would not furnish them genuine, from the manufactory itself. This would prevent the frequent and great mortifications, which the most eminent artists of the present time have undergone, of seeing the beauty of their works quickly fade; and of suffering the reproaches and reflections of those who have purchased them.

There was another article in this class, of very considerable importance, in which the Society exerted their endeavours to serve the public. It was the procuring to be laid open *the art of DYING LEATHER RED and YEL-*

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LOW, as *practised in the EAST, for that kind called TURKY LEATHER.* The secret of these methods was brought over by an Asiatic, who first came to England on some business, seven or eight years ago. Having received great civilities in our country, he was prevailed upon by two gentlemen, who were zealous members of the Society, to try, on his return to the East, to make himself master of this and some other arts not known here, in order to communicate them, by means of the Society, in case he should again come to England. He performed this accordingly: and brought with him, not only the process for dying the Turkey red and yellow leather, but a proper quantity of the ingredients, for shewing the effects of it to the Society. Some circumstances prevented this being done at that time; but, on a second return hither, the matter was proposed to the Society, who agreed to give him one hundred pounds, as a reimbursement of the expence he had incurred in obtaining the secret of this art.

In pursuance of this agreement, the recipes for both dyes were delivered by them to the Society; and the processes were performed before a committee, on several skins. The Society then came to the following resolutions, with respect to his performance of what he had taken upon him.

“ That the skins, dyed by Mr. Philipo, are of a beautiful colour; equal to the best foreign skins, commonly imported; and being compared with the Turkey appear superior to them: That Mr. Philipo has revealed the manner of dying red and yellow Turkey leather; and performed the principal operations, before a committee, to their satisfaction: and is, therefore, intitled to the sum of one hundred pounds, according to the agreement made by the Society with him.”

After this, it appearing from facts, there was no reason to doubt, that he had not been a gainer by the bringing over these secrets; which he had acquired with great trouble, and at an expence equal to the sum he had received from the Society; and, also, on unquestionable testimony, that he refused a much greater premium, which had been offered him to reveal them to private persons for their use, instead of laying them open according to his proposals; the Society came to the follow-

following resolution, to present him with a gold medal.

“ That Mr. Phillipo having performed his agreement
 “ with the Society, to their satisfaction ; the colour of
 “ the leather, dyed by him, being superior to that of
 “ the foreign brought hither ; and the sum paid to him
 “ by the Society, being scarcely more than a reimburse-
 “ ment of his expence, and much less than he could have
 “ gained, by selling the secret to private persons ; in
 “ consideration of the great benefit his revealing this
 “ secret to the Society, may be to the public ; and of
 “ his generous behaviour ; the gold medal of this Society
 “ be presented to him.”

The processes for dying the Turkey red and yellow, thus obtained by the Society, are, together with some notes, added to explain the nature of two of the principal ingredients, unknown here, and the means of procuring them, inserted below in this volume, at their request. They will undoubtedly be of very material benefit to the public : as they teach the method of dying leather of these colours, in a manner superior to that usually imported here, under the name of Turkey leather. The consumption of this kind of leather, particularly the red, in book binding and other purposes, is very considerable ; and we have for some time had the greatest part of what we use from Lisbon. It appears from a computation, founded on the clearest state of facts, that we can produce the same here, dyed in this manner, at a much lower price than we now purchase it at from thence. There is one large manufactory of it set on foot already : and others will certainly be established as soon as the process is made public ; and the ingredients, abovementioned, can be procured in due quantity ; which is a matter of no difficulty : as they are to be purchased very cheaply at Aleppo, Smyrna, Gallipoli, or any other ports in that part of the world. The public are, therefore, greatly indebted to the Society for the acquisition of this art, of producing among ourselves a commodity, we before purchased of foreigners to a great amount ; and which, by being rendered much cheaper here, may be applied to many uses in furniture, and other purposes, where it will add to the national elegance.

S E C T. VI.

Of Improvements relating to our Trade with the British Colonies.

THE increase of trade with our colonies, on such foundation, as leads to their taking manufactures, or other profitable commodities from us; and making a due return in what we want, where the balance in money is defective; is of the utmost consequence to both parts of the community. The promoting, therefore, in the colonies, the introduction or progress of such arts, or culture, as may afford the articles proper for our importation, must conduce to this end; and, consequently, falls strictly within the views of the Society. They have, accordingly, made very strong and successful efforts, to transmit to the colonies the intimation of such matters, of a more obscure nature, as promised to yield these advantages; as well as the knowledge in some instances of the means of attaining them; and to encourage, by the offer of rewards, the pursuit, not only of those, but of others, that were more generally known, but not yet established in any effectual manner.

Among these, one of the first objects was the *production of SILK in the AMERICAN COLONIES*. The importance of producing silk in our own dominions has been before touched upon: and, indeed, requires little elucidation. This matter had been begun already in Georgia: but the Society both strove to add to the encouragement of its progress there, and to the extension of it to other colonies.

With these views, they first offered, in 1755, the following premium for the planting mulberry trees in Georgia, with a view to the providing food for silk-worms.

“ To the person, who shall plant, and properly fence,
“ the greatest number of white mulberry trees, on his
“ own plantation, in the province of Georgia, ten pounds
“ sterling.

“ For the second greatest number, five pounds.

“ For the third greatest number, three pounds.”

In 1756, these premiums were again offered for Georgia;

gia; and the Society, also, proposed to give the same for the cultivation of mulberry-trees in Carolina. The next year these premiums were dropt, in order to make room for others, which the Society imagined would have more influence with those, on whom the production of silk there depended. However, the premiums for both those provinces were claimed, and allowed the first year they were offered.

In 1757, a premium for the silk itself, was substituted in the place of that for mulberry-trees; and advertised in the following manner: "The production of silk in our
" American colonies, being undoubtedly a proper object
" of encouragement, as it must tend greatly to the advantage of those colonies, and prove highly beneficial to
" the mother-country, by promoting a very valuable
" branch of its manufactures; in order to forward the
" same, by such bounties, as may operate in equal proportion, to the benefit of the poorest, as well as of
" the richest planter; the Society propose to give, for
" every pound weight of cocoons, produced in the province of Georgia, in the year 1757, of a hard, weighty, and good substance, wherein one worm has only
" spun, three-pence.

" For every pound of cocoons, produced in the same year, of a weaker, lighter, spotted or bruised quality, though one worm has only spun in them, two-pence."

" For every pound of cocoons, produced in the same year, wherein two worms have interwoven themselves, one penny."

These premiums were continued the next year: and at the same time, the Society, to promote as much as lay in their power the production of silk in the colonies, proposed the same premiums for two other provinces, Connecticut and Pennsylvania.

In 1759, the same premiums for silk in Georgia were again offered. But those for Connecticut and Pennsylvania were changed: and the province of North Carolina was also admitted to receive the same benefit from them as those other colonies. The Society offered then, "for
" every pound weight of merchantable raw silk, raised,
" and produced in the colonies of Connecticut, Pennsylvania, and North Carolina, in the year 1760, two
" shillings and sixpence."

And, "Whereas the object and intention of the Society, in giving the abovementioned premiums, were to encourage, as far as in them lay, the importation into this country, from our own colonies, of this very valuable material of manufacture, which was then imported, at a great expence, from foreign nations; in order to promote that end, for the mutual benefit of the mother-country and the colonies, the Society agreed to give a further premium of one shilling, for every pound weight of raw silk, imported into England, from the said colonies of Connecticut, Pennsylvania, and North Carolina." All these premiums were continued to be advertised to the year 1762. Another additional one was then resolved upon for this article. It was, "For the greatest quantity of good merchantable raw silk, not less than one hundred pounds weight, produced in any of the British American colonies, and imported into the port of London, one hundred pounds; but Georgia, South Carolina, North Carolina, Connecticut, and Pennsylvania, are excepted, those colonies having a particular premium.

"For the next greatest quantity, not less than fifty pounds weight, fifty pounds.

In 1763, the premiums for silk cocoons in Georgia were again offered: and the same, also, were proposed to be given for them in South Carolina. Those for the producing raw silk in Connecticut, Pennsylvania, and North Carolina, were likewise continued. But the premium for the importation of silk from those colonies was dropt, to make way for the continuance of those offered for the importation of silk from any of the British American colonies, under the same restriction as when first advertised in 1762. In 1764, the premiums, as they stood the preceding year, were again proposed to be given, and were continued to the year 1766; when those of one hundred pounds, and of fifty pounds, for importing silk from any of the British American colonies were dropt. But those for silk cocoons in South Carolina and Georgia; and for raw silk in Connecticut, Pennsylvania, and North Carolina, were not discontinued till 1767.

In 1759, claims were made by several candidates for the premiums, to the amount of eighty-seven pounds, for producing silk cocoons in Georgia, and allowed. They were

were again adjudged in 1760, to various candidates, to the amount of one hundred and thirty pounds: also in 1761, to the amount of one hundred pounds: and in 1762, to the amount of sixty-five pounds. In 1763, the premiums were again allowed to many claimants for silk cocoons in Georgia, both of the best and inferior kinds: in all to the amount of one hundred and eighty-eight pounds. In 1764 there were several candidates, whose claims appeared to be, as well for the premiums for Georgia as South Carolina: and these also were allowed, to the amount of one hundred and ninety-three pounds. In 1765, a slight attempt seems to have been made, to produce silk in Connecticut, by the premiums paid to candidates there: which were, however, not more than eight shillings and nine-pence. But one hundred and ninety pounds were paid the same year for the claims in Georgia. In 1766 there were again many candidates for the premiums for producing silk in Georgia and South Carolina: to whom they were allowed, to the amount of one hundred and fifty-five pounds: and, also, in 1767, to the amount of two hundred and fifty-four pounds.

It appears hence, that slow advances have been made in the production of silk in our American colonies, notwithstanding the sanguine hopes, which were entertained at first of it. The government thought the prospect so promising of national advantage, as to give a considerable bounty; and to establish a public filature in Georgia. The Society seconded the views of government; and generously added their mite. But yet no adequate fruits of their joint encouragement have been reaped: nor will that appear strange, when we consider minutely the circumstances on which this matter depends. To produce a great quantity of silk, a great number of hands must be employed. They can only be employed in that work a part of the year: and the return of their labour will fall far short of being a maintenance to them for the rest. It is not only the spare hands, therefore, such as women and children, in the families of labouring people, who derive their principal support from some other source, that can carry on this business: and there is only a small number of such in a young colony; or, indeed, in any colony. The production of silk, consequently, not being a provision for families, will never draw people to a new

place: and if any were settled with that view, they would in time quit it. For the gain is so limited, as the undertaking cannot be enlarged, but by the addition of fresh hands, which cannot be retained for this purpose solely, that whenever the people get into tolerable circumstances, they will turn their application to something better. We see accordingly, that since the Society have given premiums for this matter, it declined for several years, till the last, in Georgia, though the colony itself increased: and it rose in a little settlement in Carolina, where there were some new people, who had not similar opportunities of more advantageous undertakings. Some attempts have been lately made to carry over to Florida, a number of people from the eastern part of Europe, who were accustomed to the production of silk: and several French have been sent to Carolina with the same design. If employment in some other way can be found for them, the part of the year they are not engaged in this work, they may be kept to such an undertaking; and possibly induce others of their countrymen, who are distressed at home, to join them. But great progress can never be made in this article, where there are but few people: or where the labour of those employed will bear a considerable rate, if applied to other work. The production of silk is, therefore, much fitter for a populous country, where there are great numbers of women and children, who have no employment; and to whom, consequently, every opportunity of earning somewhat is a matter of gain worth their regard. These circumstances seem to render the production of silk much more suitable to Great Britain than the colonies, as we have above had occasion to observe: and the Society, having nobly contributed one thousand three hundred and seventy pounds towards the establishment of it in the latter, have now begun to encourage, by various proper means, the trials in the former: where, if success should follow their endeavours, it would be of exceeding great service, as well in a political as commercial light. As it would save vast sums to the public, give bread to the necessitous, and find work for the idle: without taking off the hands from our present manufactures, or from husbandry.

The *production of WINE in the American colonies*, was another great object, that falls in this class, which the Society early adopted. Several attempts had been made,

made, without success, to introduce the vines of the eastern continent in to our American colonies, in order to the making wine: and a governor of Georgia, in particular, had been fruitlessly at considerable pains and expence on this account, there. The Society, however, deeming it not impracticable, and urged by the importance of the view, entered with great spirit into the design of encouraging it: and have pursued their intention by the offer of various premiums.

They first, in the year 1758, proposed the following premium for the wine itself. "As producing wines in our American colonies will be of great advantage to those colonies, and also to this kingdom; it is proposed to give to that planter, in any of our said colonies, who shall first produce, within seven years from the date hereof, from his own plantation, five tons of white, or red wine, made of grapes, the produce of the colonies only, and such as, in the opinion of competent judges, appointed by the Society in London, shall be deemed deserving the reward; not less than one ton thereof to be imported at London; one hundred pounds." This premium was continued to be advertised to 1765, the period appointed for the bringing in the claims, and then dropt. After the year 1759, a *nota bene* was added to the advertisement, which expressed, "that the method of cultivating vines for wines, and the manner of making wines in different countries, were to be found in *Miller's Dictionary*, Edit. 1758." During the time this premium was offered, others, for the raising vines for wines, were also proposed to be given. The Society very properly imagined, that the first step towards establishing a matter of this kind was, to incite numbers, by large rewards, to undertake the planting such vines as are best for the production of good wine. This was certainly necessary, before the other premiums for wines could have any effect. The Society, therefore, in 1762, published the following advertisement. "A premium of two hundred pounds will be given for the greatest number, not less than five hundred, of the plants of the vines, which produce those sorts of wines now consumed in Great Britain, which shall have been properly planted, and effectually fenced, secured, and cultivated within any of the British colonies upon the continent of North

“ America, to the northward of the river Delawar, considered as one district, between the 1st of April 1762, and the 1st of April 1767: and fifty pounds for the next greatest quantity, not less than one hundred plants.”

The like premiums were separately offered “ for any of the British colonies on the continent of North America, to the southward of the river Delawar.”

And the same was also proposed “ to the Bermuda islands.”

To these advertisements, was subjoined a *nota bene*, declaring, that “ the person who should be entitled to the premium for making five tons of wine, as published in the list of premiums, in 1761, should not be intitled to these premiums.”

In 1763, the Society thought proper to continue the premium for the planting vines in the colonies to the southward of the river Delawar, and the Bermuda islands, to the year 1768. In 1765, they also proposed to give additional premiums of two hundred pounds, and fifty pounds, under the like limitations, for the planting the same quantity of vines, actually producing the grapes, which yield those sorts of wines now consumed in Great Britain, between the 1st of April 1768, and the 1st of March 1770. These they extended to the three several districts, as in the former premium of 1762.

These premiums have not been extended since the time mentioned; because the introduction of vines into America is known, by the Society, to have taken place.

The first account of the success of these premiums was in 1763; when Mr. Carter sent a dozen bottles of two kinds of wine, from grapes which grew in vineyards of his own planting in Virginia. The one of these kinds was the product of vines brought from Europe; the other of the American wild vines. They were both approved as good wines: and the Society gave their gold medal to Mr. Carter, as the first, who had made a spirited attempt towards the accomplishment of their views, respecting wine in America.

In 1767, there were claims made for the premiums on the planting vines, both from the districts to the southward and northward of the river Delawar. But the form of certification of that to the southward, not being conformable to

to the advertisement, the claim was not allowed. There were two claims for that of the northward; but the claimant, who had planted the greatest number of vines, having, also, failed in some essential points of certification, the premium was adjudged to the other. However, in consideration of having planted so great a number of vines, as two thousand one hundred, the society thought fit to give him a gold medal.

Certificates for the establishment of other claims have been again sent over this present year, the determination of which is now depending.

The Society, therefore, at the expence of two hundred pounds, and two gold medals, besides what they may pay on account of the claims now before them, and such as may be made in the year 1770, have fully succeeded in their attempts, to introduce the cultivation of the European vines into America. It is dubious, nevertheless, from the present experience, how far this will lead to the production of wine there, as an article of commerce. For the vintage is found in many parts, to be subject to such very frequent miscarriages, from the bursting of the grapes, caused by the rains, before they are ripe, as seems to take away a chance of profit from the product. But the Society's measures have occasioned trials of the native vines of America, which were before only considered as wild useless plants, that promise much better success: and the quality of the wine appears to be good, from the specimen above mentioned to be sent by Mr. Carter. There are such authorities for that opinion, that the Society have this year offered their medals, as a premium for the cultivation of the indigenous native vines. The public will, therefore, in all probability, owe to their encouragement, the production of wine in North America: which had been before, without success, attempted by several; and by some at a great expence.

The *importation of MYRTLE WAX into England*, was another early article, which the Society thought fit to encourage. The substance called by this name, is the production of a shrub, commonly termed the *candleberry myrtle*. This shrub is not, however, a myrtle, but has been named so, merely from some resemblance in the leaves and branches to those of the myrtle. Nor is this

product of it really wax, though that name has been given to it from the same principle: that is, a resemblance in some qualities to wax. But it is, in fact, a concreted vegetable oil, most like in consistence to the harder kinds of animal fat, but still firmer; and of a dull green colour. It is procured by boiling the berries of the shrub, which originally contain it. The Society's endeavouring to bring over this substance, as a merchantable commodity here, must only be considered as a trial of what might be done, with respect to the rendering it an article of commerce. For though it be used for making candles and sope in America: yet its dull colour, faultiness in not affording a clear light, and disagreeable scent, render it objectionable as to that use: and the too great price seems to be an insuperable impediment against its being applied to the making sope here, though very suitable to it in other respects. There was, however, some notion prevailing, that this substance might be bleached; and made to answer the purposes of wax: and, the nature of it not being well understood, in general, the Society were induced to offer, in 1759, the following premiums. "Whereas myrtle wax, which has been hitherto imported in small quantities only, has been found by experience, to make an excellent sope, and when bleached, to answer the purpose of white wax: a premium of thirty pounds will be given for the greatest quantity of myrtle wax, imported from any of the British colonies in America, not less than five hundred pounds weight at one importation, into the port of London.

"For the second greatest quantity, not less than five hundred pounds weight, twenty pounds.

"For the third greatest quantity, not less than five hundred pounds weight, ten pounds."

The next year the same advertisements were continued: but in 1761 they were dropt.

These premiums were claimed in 1761; and the first and second allowed. But it then appeared, that there was no vent for myrtle-wax here. The making sope of it was not generally understood: and though it is an excellent material for some kinds, it was yet much too dear. For, notwithstanding this substance bore a moderate price in America, while the demand for it was small; yet it rose on being purchased to make up the quantities to gain the Society's premiums; and could not be brought hither,

ther, even at the price then paid, under ten pence a pound at least: which was too much for the sope-boilers to pay. As to making candles of it, the objection held still stronger, as to the price, from its defective and faulty qualities: and the bleaching it was not only an undiscovered matter, but favoured much of impracticability, in the opinion of those, who are most intelligent in such subjects. The Society, therefore, with great reason discontinued the premiums for this article: having given a fair opportunity, by occasioning two very considerable quantities to be brought over, to those, who could improve this substance, or employ it to any advantage. But it does not appear to have been ever applied to any profitable purpose here, but the sophistication of plasters in the manufacture of them, by some wholesale dealers in medicinal preparations.

The *importation of STURGEON from our colonies*, was, likewise, another object of the Society's encouragement. The exceeding great quantity of this fish in the creeks and large rivers in the northern American colonies; and our purchasing what we consume at present from the northern parts of Europe; induced the Society to offer, in 1760, the following premium. "Sturgeon
" being found in great abundance, in many of the rivers
" of North America; it is proposed to give a premium
" of fifty pounds, to the person, who shall import into
" the port of London, from any of the British colonies
" in North America, the greatest quantity of sturgeon,
" not less than one hundred kegs, containing five gallons
" each, equal in goodness to the best imported from
" Dantzick." This advertisement was continued to 1763; but then the Society reduced the number of kegs to fifty; and added a second premium of twenty-five pounds, for thirty kegs. In this manner they were continued to 1766: but then were dropt.

There were several claims for this article. The first were in 1765, by two candidates: to whom the premiums of fifty and twenty-five pounds were adjudged. In 1766, the first premium was again given to another claimant.

The Society have, therefore, so far succeeded, as to procure the bringing over several considerable quantities of sturgeon from North America. But it has not had the

the proposed effect, of occasioning our demand for this article to be supplied from the colonies. This is owing, partly to the difficulty of disposing of considerable quantities, when brought over together; there being no regular trade for sturgeon; but only smaller quantities brought, from time to time, by masters or mates of vessels, who supply the fish-mongers: and partly to the American sturgeon's not appearing the same in flavour and colour with that usually sold. It was, nevertheless, perfectly good, after being kept some time in fresh pickle. But the warmth of the climate it undergoes, and the length of the passage, make it require that the pickle should be originally stronger; or what is more effectual, that is, should be renewed after the arrival of the sturgeon here. By a proper attention to the treatment, there can be no doubt, but that the American sturgeon may be made to resemble exactly the European sturgeon eaten here; as the fish itself is the same; and it may be brought hither at the proper season with convenience.

The production of POT-ASH in our American colonies, was a very important pursuit, which the Society took upon them early to promote. The attainment of this was a matter of the utmost consequence to the manufactures of Great Britain and Ireland; as well as to the colony interest: and though some attempts had been made to it, there was at that time no prospect of its being brought about, if the Society had not administered their effectual aid. It is proper, therefore, the public should know in in what degree, they owe the very great advantages, that may accrue from this acquisition, to the munificent encouragement, and intelligent assistance of the Society: which have been the sole means of establishing a matter of so much moment, and so much difficulty. To judge, however, of the importance of this concern, and the necessity, as well as efficacy of the means employed by the Society, with respect to it, there is occasion to premise some account of the nature of pot-ash; and of our situation as to the procurement of it, before the American source of supply was opened.

Pot-ash is an alkaline, salt, of that kind called the vegetable alkali, obtainable from most vegetables, by burning or incineration. In the common sort of pot-ash, besides the alkaline salt, there is contained a considerable proportion of calcined earth, or, in other words, of the
ashes

ashes of the vegetable, and generally some of the fixt sulphur and burnt oil of the calcined plants. A purer kind, however, being necessary for many purposes, such is accordingly prepared, by freeing it from the sulphureous and earthy parts: and this is called *pearl-ash*. Before our obtaining any pot-ash from America, we purchased of foreigners, principally for money, nearly the whole of what we consumed of these commodities: which amounted to a national expence, according to some calculations, exceeding a hundred and fifty thousand pound *per annum*. But what was still more disadvantageous to our affairs, the great increase of the consumption of pearl-ash, on account of bleaching, in the manufactures of linen and cotton, as well as the printing them; together with the decrease of the production of pot-ash and pearl-ash abroad, from the failure of wood in the countries whence they were imported; was occasioning the price of these commodities to rise very high; and would have brought great embarrassment on some of the most valuable of our manufactures, without a seasonable supply. At the time the Society took up this matter, it was, therefore, become a very weighty object of national concern: and another accidental circumstance rendered their undertaking it still more meritorious. This was, that some attempts, made with the assistance of government, soon after met with such miscarriages, as would have produced an almost insuperable discouragement to future trials, had not such cheap and easy means been pointed out, as removed the prejudice against the practicability.

The first endeavour to establish the manufacture of pot-ash and pearl-ash in America, was made by Mr. Stevens: who went thither with that design, about twenty-five years ago. He found great difficulties in preparing, by the process used in Europe, such kind of potash as was saleable here: and the produce, after freight, and all other contingent expences were defrayed, did not well answer, according to the price at which he could dispose of it. He, therefore, applied himself to improve the process; and, at length, invented a new method of making pot-ash; which produced such as was so perfectly good as to answer in bleaching, and other uses, the purposes of pearl-ash; and which, at the same time, afforded a larger produce. After setting on foot a work of this kind, he came to England; and made application to the government

ment for an encouragement to the establishing this manufacture in North America. The assistance he desired, was a bounty upon the imported commodity, which was refused: but, on proving the goodness of his pot-ash, and the importance of its use, he had three thousand pounds granted him, as an aid to enable him to proceed: and he went to several of the colonies; and engaged with proper people to erect works. There was, nevertheless, one unhappy circumstance attending his method, that entirely defeated all efforts to render it profitable to the undertakers, notwithstanding the increase, and goodness of the product. There was required, for the due execution of his process, an extreme great degree of heat, in order to fuse the alkaline salt: and this heat, together with the fluxing power of the alkaline salt, presently fused the furnace likewise; and caused the destruction of an expensive apparatus; and a ruinous delay of the work, till a fresh one could be constructed. Mr. Stevens spared no pains to remedy this defect in his method, either by the choice of such materials for building the furnaces, as might resist the vitrifying power of the fire and salts; or such fabrication as might regulate the heat. The utmost, however, he could effect, was to render them capable of undergoing the requisite heat, when he conducted the operations with the greatest care and skill; but when they were left to the management of others, the furnaces were soon destroyed. and, with them, generally, all the hopes and spirit of proceeding in the proprietors. These events, in a short time, put an end to the use of this method; and the manufacture of American pot-ash, that depended on it.

Mr. Stephens deserves, nevertheless, the applause of his countrymen, for his long exercised assiduity and fortitude, in pursuit of this object, notwithstanding the most discouraging difficulties;—for his ingenuity, in discovering the abovementioned method of making pot-ash, and the principle on which it depended, as it failed of success, only from the defect of proper materials for building the furnaces;—and for having first engaged, by his negotiations, in almost all our North American provinces, the attention of the inhabitants to this great concern; and prepared them, thence to embrace and execute a more safe and easy method, when offered to them in a manner that removed their doubts
of

of the practicability. He ought, in fact, to be considered as the first, and a very principal instrument of introducing this profitable article into our colonies; and was well intitled to what the government granted him: which I am afraid, from its being intirely applied to the prosecution of his designs, rather proved an ineffectual aid to them, than a reward, by being made an addition to his own fortune.

During the continuance of Mr. Steven's attempts, the Society first determined on the encouragement of this matter. Not knowing, then, the impracticability of Mr. Stevens's method; nor, consequently, the languishing state of the attempts to make pot-ash in America; they offered, in 1758, the following premium.

"The money paid to foreigners for large quantities of pot-ash, used in our manufactures, being very considerable, the Society promise to give to the person, who shall import into England, from any of his majesty's colonies in North America, the greatest quantity of pot-ash, not less than fifty ton, nearest in goodness to the best foreign pot-ash, at any one port; one hundred pounds." This was advertised to the year 1761: when the Society, likewise, added a second and a third premium; and offered, "sixty pounds for not less than thirty tons; and forty pounds for twenty tons." The advertisement was thus continued to 1762: and then the Society thought proper to alter it, as follows; requiring less quantities to be produced; and offering the premium for different districts. "For the greatest quantity of good merchantable pot-ash, not less than twenty ton weight, that shall be produced in, and imported from, the colonies of Nova-Scotia, New Hampshire, Massachusetts Bay, Rhode Island, and Connecticut, considered as one intire district, into the port of London, one hundred pounds. For the next greatest quantity, not less then ten ton weight; fifty pounds." The like premiums were, also, extended to the colonies of New-York, New-Jersey, and Pennsylvania, considered as one district; and, likewise, to the colonies of Virginia, Maryland, North Carolina, South Carolina and Georgia, considered as another district.

The quantity required to claim these premiums, even when reduced to twenty tons, was more than could be supplied.

supplied by any works then on foot : and, consequently, no claims were made, with any pretensions that could intitle the candidates.

In 1761, the miscarriages of Mr. Stevens's works being known ; and of course, the inefficacy of the Society's premiums, in their present mode ; a new plan of proceeding was proposed by a member, who particularly concerned himself in the Society's measures for the interest of the colonies. He advanced, that there was now no chance of inducing persons to engage in large and expensive works for making pot-ash ; as the example of the late miscarriages had damped all spirit for this undertaking : that, necessarily, the offering premiums for great quantities could have no influence : and that the only way, therefore, which remained, was, to furnish the information of a profitable method of doing it in small quantities, with little or no previous expence : and, after this information had had its due effect, to adapt the premiums to the circumstances, in such manner, that every one, who entered into the proposed undertaking, should receive a proportionable part of the advantage of them. Some very respectable gentlemen of the colonies, concerned in the public affairs of the respective provinces ; and who well knew the particulars of the late attempts that had been made to produce pot-ash in America ; supported this advice : which was, accordingly, at their earnest solicitation, put in execution.

The person who had proposed this measure, and intimated the practicability of supplying instructions for making pot-ash advantageously in small quantities, was requested by the Society to furnish such instructions ; in order that they should be sent to America, and dispersed in those colonies, where pot-ash could be made. He, accordingly, formed a set of such instructions, which was approved of, as proper for the intended purpose. In this, were contained directions, by which any person might make pot-ash, from the ashes of wood burnt in their own houses, or those they might procure from their neighbours, in the iron pots which they used for dressing their victuals ; or in greater quantities, with a larger apparatus, appropriated to this purpose ; but yet such as could be procured at a small expence, and not subject to any destructive accidents in its use. In order

to convey these instructions into as many hands as possible, in the places where they might be serviceable, they were annexed to the list of premiums, printed annually by the Society, for the use of the colonies; and sent to be dispersed there.

These measures effectually answered the end proposed. Many people, being furnished with the knowledge of an easy method of making pot-ash, which could be practised without expence or risk, applied themselves to this pursuit: and manifested the efficacy of it, by the claims they afterwards made for the premiums.

The first intelligence the Society received of this success, was in 1763, from a gentleman, who had sent over, as we shall see below, twelve tons of alkaline salt, prepared by this process; but purified so as to come within the denomination of pearl-ash. In a letter to the Society on this occasion, he mentioned the progress this article was then making: and declared, that the Society had pursued the only means which could have led to the quick and general establishment of the making pot-ash in America; by supplying the process for making it easily, that had been subjoined to their colony book of premiums; and which he had experimentally found to answer perfectly well the end.

At the same time, the period having expired to which the premiums for importing large quantities of pot-ash has been extended, the other part of the plan above-mentioned, which respected the giving them for each ton, was carried into execution; and the following advertisement was resolved upon: "For every ton of
" merchantable pot-ash, made in any of his majesty's
" dominions in America, imported into the port of Lon-
" don, within the year 1763, four pounds, except the
" several claims shall amount to a greater sum than
" four hundred pounds; in which case, the said four
" hundred pounds shall be divided amongst the clai-
" mants, in proportion to the respective quantities im-
" ported by each." This advertisement was continued to the year 1766; and then dropt: the object appearing at that time to be fully attained.

In the year 1763, claims were made on the Society, by several candidates; and allowed, to the amount of twenty-two tons. Of this pot ash, some was so good as to be fit to be used for bleaching, and other purposes, which
require

require a pure kind of alkaline salt. The next year, 1764, the claims allowed arose to ninety-nine tons: and, in 1765, they still advanced to greatly upwards of one hundred tons: which appeared so great a progress, that the Society deemed the article fully established.

The year after, the Assembly of New-England applied to the Society for their assistance in overcoming some obstacles, that had arisen to the carrying to its full extent, the manufacture of pot-ash in North America. Complaints had been made, with regard to a considerable part of what had been more lately sent to England, of depravities, which tended to discredit the American pot-ash, and lower the price of it, so as to discourage the progress of the Manufacture. This had given ground to a suspicion and charge of adulteration: and the House of Assembly, therefore, requested information of the Society: Whether that charge appeared to have just foundation: and what the best means might be, to distinguish the sophistications of pot-ash in any parcels, in order for the taking measures to suppress the practice of them. The House of Assembly signified further to the Society, that it was intended by them, when they should be provided with a proper criterion or method of assaying, as it was called, the pot-ash, not to suffer any to pass, but what came up to a certain standard of goodness. The Society, in consequence of this application, procured samples of a variety of parcels of the American pot-ash; and desired the assistance of the person, who had before given them the process by which this manufacture had been established; and also of two gentlemen, who were particularly versed in chemical matters. One of these gentlemen, being indisposed in his health, declined the task. The others gave in, each, a memoir of their opinion, founded on experiments. They varied, however, considerably in their notions. The person, who had drawn up the successful process sent to the colonies, maintained, that, though there was a large mixture of neutral salt in some parcels: and they were caustic and foul, so as to be wholly unfit for bleaching, and other finer purposes; yet the whole of this might happen from the kind of ashes whence they were extracted, and the ill management of the process. He supported this by alledging, that neutral salts abound in some vegetables which might be burnt to make the ashes: and the sulphureous matter, which

which will remain, if the pot-ash be not well purified, after the evaporation, by due heat, accounts clearly, or rather is the sole cause of such a caustic quality : which is different from that kind of causticity induced on fixed alkaline salts, by the action of lime, or great calcination : and which is, in fact, only a privation of the fixable air. The other, on the contrary, declared it to be his sentiments, that sophistications had been practised ; and particularly by the use of lime ; to which he imputed the causticity of the pot-ash. They both added instructions for the determining the purity of fixt alkaline salts ; and consequently, of ascertaining the goodness of the pot-ash. The Society very properly avoided any discussion as to the comparative justness of opinions ; directed both the memoirs to be printed, and sent to America ; and presented each of the authors with a gold medal. But as it appeared now, that strict cautions were required to be given, in the preparation of pot-ash ; and, also, that the reasons, which originally subsisted for confining the instructions to the conducting smaller works, ceased at present : the person, who supplied the process printed by the Society at first, now proposed to make some alterations in it, and to add some further directions, in order to accommodate it to the present circumstances. This was accordingly done ; and subjoined to the memoir given by him, when sent to America. As the faultiness of the pot-ash lately made in America, proceeded from a bad conduct of the process, this was the most proper, or indeed the only method, which could be followed, of applying a remedy. Since it would be in vain, for the government of the provinces, to exercise any coercive means to make the people produce this commodity in a perfect state, before they were furnished with the means to do it. Till this should be brought about, a prohibition of the exportation of all, that was not of a standard goodness, would check and discourage the manufacturers, so as to dispose them to quit the undertaking, before they had made themselves masters of the art. It would, likewise, in a great degree, confine the manufacturers to the use of ashes obtained from wood burnt on purpose. Since they could not depend sufficiently, for making a pure kind of pot-ash, on such as are now collected from families in consequence of their domestic fires. It would restrain them, also, for the same reason, from burning any

kinds of vegetable substances promiscuously. Both which limitations would greatly tend to lessen the general quantity of pot-ash produced. Moreover, the worst sort of pot-ash may very well be used for some purposes; and will, consequently, bear some price in Great Britain; and if none but the finer sorts were brought over, as the quantity of them is as yet but small, the price of them, and of pearl-ash, would of course be greatly raised. As the fine pot-ash must be then applied to the purposes, for which the coarse are now used; and which demand a great quantity. This would necessarily either injure some of our principal articles of manufacture, where alkaline salts are required, by the high price, or absolute deficiency of a due quantity of finer pot-ash and pearl-ash for the supply of the whole demand; or would occasion the recurring to the importation of coarse pot-ash from the north-eastern parts of Europe: which has been excluded by the introduction of the American. It would be, therefore, much better to make a regulated distinction between the fine, and coarse pot-ash; mark the parcels of each, after a proper assay, made according to the principles laid down in the above-mentioned memoir; and suffer both to pass, but under their respective denominations thus noted. By this means the credit of the American pot-ash would be supported. Because they, who had occasion for the fine, would not be disappointed, by having the coarse put into their hands. While, at the same time, the market would be supplied with the coarse for the use of those, whose purposes it might suit: and who would have it on cheap terms; and not be obliged to purchase the finer kind of pot-ash, or the pearl-ash, at a much higher price: and, by such means, deprive those of them, who indispensibly want these purer kinds of alkaline salts.

From what is above premised, it evidently appears, that an establishment of the manufacture of pot-ash in America was wholly owing to the means used by the Society. Yet some attempts have been made to rob them of the honour of it. In a malignant letter, published in one of the daily papers, a poor effort was made to mislead the world into an opinion, that the process for making pot-ash furnished by the Society to the colonies; and which, as it appears, by a variety of authorities, is that really practised; was taken from the process published by

Mr.

Mr. Stevens. In order to gain credit to this false suggestion, citations were made of the accounts of the apparatus, and of mutilated passages, and other particulars, out of both the processes. The necessary vessels, and the manner of making the ley, did indeed appear similar in them: there being no novelty in either. For the operation consisting only in mixing water with the ashes, and drawing it off after it is impregnated with the salt, is of so simple a nature as scarcely to admit of any variation, but that of adapting the magnitude of the vessels, or the convenience of their form, to the quantity of the ley required: and they are, therefore, much the same every where. But, in order to carry the resemblance into that part of the two processes, where the essential difference lay; and on which the success of one method, and the failure of the other, depended; a most false and base misquotation was employed. The description of Mr. Stevens's furnace, which served both for evaporation and fluxing the salt, was suppressed: and that of a caldron was obtruded in its place, which he never mentions in his process for making pot-ash: and which could have no possible office, or use in his method: his evaporating and fluxing furnace being a substitute for it. In fact, whoever compares the two processes will clearly see, the one was adapted to the view of saving the hazard and expence necessarily incurred in the other; and the success of it, after the failure of the other, without any speculative comparison, demonstrates the difference, by a palpable fact; and at the same time exposes the turpitude of such mean low endeavours to impose on the public, and depreciate the Society, for the sake of an envious disparagement of a particular person. Let the Society, therefore, have the full acknowledgements due to them both from their mother-country, and the colonies, for having procured to the first a durable supply of an article absolutely necessary to our most important manufactures; which we were, otherwise, in the greatest danger of failing to procure: and saved to the British community the great sum of money we formerly paid for very near the whole of what we consumed of it to foreigners; which will now be a future source of riches to the colonies.

Along with the encouragement of the making pot-ash in America, the Society took up that of making PEARL-

ASH; which is intirely a similar article, as the one is, in fact, only a purer kind of the other: and applicable to the same general purposes. What has been before said of the pot-ash may, consequently, be applied to pearl-ash, as far as regards the utility, and the reasons for the Society's adopting it as an object of their premiums.

The first, they offered, were in 1761, and were advertised as follows: "To the person, who shall import, from any of his majesty's colonies in America, into any port in England, the greatest quantity of merchantable pearl-ash, the produce of the said colonies, not less than thirty tons, one hundred pounds. For the next greatest quantity, not less than twenty tons, sixty pounds. For the next greatest quantity, not less than ten tons, forty pounds." These premiums were continued for 1762: at which time, the Society changed the mode: and advertised the same premiums for this article, as those for the pot-ash above recited.

In 1763, the advertisement was again altered, and a premium of four pounds per ton for pearl-ash imported here was proposed, with the same restrictions as in that for pot-ash of the same date. It was continued thus to the year 1767: when it was dropt.

The premiums offered for the large quantities, before 1763, were never claimed. The first application, which was of the nature of a claim, was made, in that year, by the gentleman abovementioned, who gave the account of the good effects of the process for making pot-ash, published by the Society. He sent notice, he had imported twelve tons of pearl-ash: and the specimens which were produced, appeared, on examination, to be good. But not having complied with the conditions of the Society's advertisements, as to the form of certification; and intimating his desire of receiving an honorary, rather than a pecuniary reward; they gave him their gold medal, on the merits of his being the first who had made, in America, and imported into Britain, a considerable quantity of good pearl-ash.

The first, and only regular claim was in the year 1766, when there was one candidate; to whom six pounds two shillings were given, as the proper share of the premium for the quantity imported.

It may be collected, from this want of claims of the premi-

premiums, that the preparation of pearl-ash has not made a correspondent progress in our colonies with that of pot-ash. The reasons, most probably, are, that it demands the expence of an additional furnace, which requires some skill in the construction; as also, of the knowledge of an operation for calcining the alkaline salt, as prepared according to the Society's process for pot-ash: or, if not very pure, of refining it, by solution and evaporation. But the higher price of pearl-ash; and the certainty of vending it, if good; would render the preparation of pearl-ash very profitable to those, who would undertake the making it in considerable quantities, instead of the pot-ash. And the alkaline salt, prepared by the Society's process, is easily convertible into good pearl-ash by calcination only: provided it be made from wood, or other vegetable matter, that contains the least quantity of neutral salt; and the ley be of due purity. There can be no doubt, consequently, but that the preparation of pearl-ash will gain ground in our colonies: and that our consumption will be thence supplied. Though, if the pot-ash, produced by the Society's process, were prepared in a perfect manner, it might be substituted for pearl-ash, in most of the principal uses; and would supersede a great part of the demand for it. In either light, the Society's endeavours will have had the desired effect; and procure for the public, one of the most important advantages to our commerce.

These are the articles respecting improvements in the colonies, for which the Society have proposed premiums, that have been obtained. There are many others, some of them of considerable moment, for which they have offered premiums, that have not been claimed. But, for the reason advanced before, the knowledge and remembrance of them ought to be kept up, and propagated by every means: as it may conduce, in several cases to the future attainment of the object.

One of the first of these articles was *the cultivation of LOGWOOD in our American colonies*. The utility of this wood in dying; and the difficulties and contests betwixt ourselves and some other powers, which have attended our cutting it in the bays of Honduras and Campeachy, whence we have been supplied with the greatest part of what we consume; disposed the society to believe, it

might be good for the public, to obtain it from our undisputed dominions in America.

Accordingly in 1757, the Society offered the following premium. "For planting the greatest quantity of logwood, in any of our plantations, twenty pounds. "For the second greatest quantity, ten pounds." In 1758, the first, only, of these premiums was continued. And, instead of the second, "forty pounds were proposed to be given for planting the greatest number, not less than five hundred, of logwood trees, before December 1760." In 1760, the premium that was offered in 1757; and which was continued, with the alterations above mentioned to have been made in it: was dropt. But the premium of forty pounds, first proposed to be given in 1758, was advertised till the year 1761; when it was, also, discontinued. In 1762, this matter was taken up afresh by the Society; who then increased the proposed reward greatly. For in that year, they offered "one hundred pounds, for planting the greatest quantity, not less than one thousand; and fifty pounds, for not less than five hundred plants of the true logwood tree, in any of the British Bahama Islands in America." And they were thus advertised to the year 1765: when the premiums for this article were intirely dropt.

These premiums were never gained. The logwood tree had, before the time they were first offered, been carried into Jamaica, Barbadoes, and other of the sugar islands: where it was found to be so far from a desirable subject of culture, that, from its great proneness to propagate itself, it was become very troublesome, as a weed. Quantities of the wood have been imported hither from thence; particularly from Jamaica. But it has been looked upon as inferior in goodness to the Campeachy and Honduras logwood. As the plant is actually of the same species in both places, this difference must be imputed to the want of age in the trees from whence the wood was obtained in our islands: or to some other mismanagement. However, under these circumstances, small pecuniary premiums for the cultivation of trees, which grew wild so profusely; and which were not, in general, esteemed worth the cutting down; could have no operation in the sugar islands. If they could have taken effect any where, it must have been in the Bermuda, and Bahama

Bahama islands, where wanting greater objects, less become of importance. But the distant return which trees afford; and the labour of planting, fencing, cutting, &c. prevent planters from chusing such articles, while others remain, where they may employ their money and attention with a prospect of quicker gain. The Society, therefore, have, very properly, discontinued these premiums: and it is a matter of less concern, that they did not meet with success: as we have now an establishment, in the part of America, which has hitherto afforded us logwood; whence we may be, with ease and certainty, supplied, without the difficulties and disputes, that have formerly occurred.

The production of SAFFLOWER in our American colonies, was another article of a similar kind, of which the Society took up the encouragement at the same time. It is the petals, or leaves of the flower of an herb, called *Carthamus*, or *bastard saffron*: and is of great use in dying. We are at present supplied with this drug from the warmer countries of Europe; principally from Spain. The carthamus is an annual plant: and there appeared reason to believe, it might be cultivated easily in our American colonies. The Society, therefore, in 1757, offered the following premium. "For sowing, raising and curing the greatest quantity of safflower, in any of our plantations, not less than five hundred pounds weight, fifteen pounds." The next year this premium was again advertised: and ten pounds were also, then offered for the second greatest quantity. These premiums were continued to the year 1762. But then the Society greatly augmented them: and proposed, in the following advertisement, to give "fifty pounds, for producing in, and importing from, any of the British colonies in America, the greatest quantity, not less than one hundred pounds weight, of merchantable safflower: and for the next greatest quantity, not less than fifty pounds weight, twenty-five pounds." In 1763, the same premiums were offered: but the Society reduced the quantity to be produced to fifty pounds weight in the first, and twenty pounds weight in the second premium. They were thus continued to 1766; but then dropt.

This premium was never claimed. Though it has been said, attempts have been made to produce safflower

in some of our northern colonies. The great obstacle is, the labour required in collecting the flowers, and picking the petals from them: of which, from their smallness, a very great number go to form a pound weight, when they are dried: and, moreover, the price of safflower is low with us. This renders it a less suitable matter to the colonies, where labour is dear: and where such articles, as require it, cannot, consequently, take place, till the people are more numerous, and supplied more cheaply with those necessaries of life, they have now from Europe. The Society, however, did very properly, in endeavouring to procure a trial, how far it might be practicable to introduce the cultivation of safflower into our American colonies.

The cultivation of OLIVE TREES, with a view to the production of OIL in our American colonies, was a very important object of the Society's early attention, and premiums. The great consumption we make of olive oil, as well in manufactures, and other uses, as for the table, renders it desirable we should produce this article among ourselves; and not continue the advantages of it to foreigners. There was, moreover, a very specious prospect that, out of the variety of climates, and situations of the countries we possess in North America, some might be favourable to olive trees, and admit of their being cultivated, so as to yield fruit equally well with those on the eastern continent, which produce the oil consumed by us. The Society, therefore, in the year 1760, proposed the following premiums.

“ For planting, cultivating, and properly securing,
 “ within four years from the date hereof, in any of our
 “ colonies southward of the Delaware river, the greatest
 “ number of olive trees, not less than one thousand, for
 “ the production of oil, fifty pounds.

“ For the second greatest number, not less than eight
 “ hundred, forty pounds.

“ For the third greatest number, not less than six
 “ hundred, thirty pounds.”

In 1759, the Society proposed to give the like premiums, on the above conditions, “ for the planting the
 “ greatest number of olive trees, within four years from
 “ such date.” These premiums were discontinued at the expiration of the respective terms specified in the advertisements.

tisements. But, in 1762, another advertisement was thrown out by the Society, for the encouragement of this article; in which the sums were augmented, and the number of trees to be cultivated, reduced. "One hundred pounds were offered at that time, for the greatest number, not less than five hundred plants, of olive trees, of the same species as those from which the best Italian oil is produced, properly planted, and effectually fenced, secured, and cultivated, within any of the British colonies upon the continent of North America, to the southward of the river Delawar, considered as one district, between the 25th of April 1763, and 25th of April 1765; and fifty pounds for the next greatest number, not less than two hundred plants." These were continued to the year 1767; and then ceased.

These premiums were never claimed. But they had the effect of procuring trials of the cultivation of the olive tree, in various places within the district described; of which the Society has been apprized. It is remarkable of this tree, that it will live in England, and many of the northern parts of Europe, but not produce fruit: and somewhat like that was found to happen in the parts of North America, for which the premiums were proposed. This may be imputed to cold in the one case, but cannot in the other; as some of those countries are much hotter in summer than many places on the eastern continent, where olive trees not only thrive, but are very fertile: and these countries are not subject to extraordinary cold in winter. It appeared, however, by several accounts, that olive trees did not produce fruit in the North American provinces, where it was proposed, by the Society, to encourage the planting them: and they, therefore, discontinued their premiums, as deeming the object hopeless. Nor has there been any information since of better success: as it has never been pretended, that olive trees have afforded good fruit in those parts of America: at least in such quantities as promised to be of any commercial benefit. It must be allowed, nevertheless, to be probable, that some place or other, in the very large extent of country, we now possess in America, may be suitable to this tree: and that, hereafter, it may be cultivated with benefit. The Society have laid the foundation for such expectations, by having promulged the notion of the utility, and incited, by their premiums, the introduction of the olive tree into
several

several parts of North America; from whence plants of it may be easily conveyed, in order to the trial of them in other places, where it has not yet been determined whether they will prove fertile or not.

The *production of COCHINEAL in our colonies in the West Indies*, was, likewise, thought a fit object of the Society's encouragement. This drug is of the greatest consequence in dying: as not only the scarlet in woollen, but many other important grain colours, both in woollen and silk, depend upon it. The consumption is, therefore, very considerable, as well as the price great: and we are obliged to purchase from foreigners, the whole of what we consume of the true kind. Cochineal is a small fly, which breeds on a particular species of the opuntia, or Indian fig. But, besides the true kind, there is another species, more generally found: which breeds on other species of the opuntias. This is called the Sylvester: and is much inferior for the uses of dying; but yet collected and brought to Europe, where it is sold at a lower price.

It was presumed, from mistaken information, that cochineal was naturally found in South Carolina; and concluded from thence, that it might be propagated there, and rendered an article of commerce. This arose from not distinguishing the true kind from the Sylvester: which seems to attend some species of the opuntia every where; as I have seen it on a plant of that kind, even in a hot-house near London. The similarity of climate, and other circumstances, gave reason to believe, with still greater foundation, that this animal might be produced in our West India islands, with the same natural advantages as on the parts of the continent of America belonging to Spain. And the same confusion of the two species of this kind of fly, occasioned it to be asserted by many, that the cochineal abounded in Jamaica, and other of our islands. The Society, on these grounds, were induced, in the year 1759, to offer the following premiums.

“ For the greatest quantity of cochineal, not less than
 “ twenty five-pounds weight, properly cured, that shall
 “ first be produced from any plantation, or plantations,
 “ by any planter in South Carolina, within the space
 “ of three years from the date hereof, one hundred
 “ pounds.

“ For the second greatest quantity, not less than twenty

“ ty-five pounds weight, as above, fifty pounds.

“ For not less than twenty-five pounds weight,
“ produced as above, in Jamaica, one hundred
“ pounds.

“ For the second greatest quantity, not less than twen-
“ ty-five pounds weight, fifty pounds.

“ The like premiums were proposed to be given for
“ the production of the abovementioned quantity of co-
“ chineal, in any of the British colonies, settlements, or
“ dominions.”

In 1762 the Society augmented the premiums, and
thus divided them. “ For the greatest quantity of co-
“ chineal, not less than twenty-five pounds weight, pro-
“ ducing in, and imported from, the Bahama islands,
“ between April 1762, and April 1765, one hundred
“ pounds.

“ For the second greatest quantity, not less than twen-
“ ty pounds weight, sixty pounds.

“ For the third greatest quantity, not less than fifteen
“ pounds weight, forty pounds.

“ For the fourth greatest quantity, not less than ten
“ pounds weight, twenty pounds.

“ For the fifth greatest quantity, not less than five
“ pounds weight, ten pounds.

“ The like premiums are proposed to be given, upon
“ the same terms and conditions, for cochineal, pro-
“ duced in, and imported from, the provinces of Geor-
“ gia, South Carolina, and North Carolina, consider-
“ ed as one district: and, also, from the island of Ja-
“ maica.”

In 1765, the same premiums were again offered “ for
“ the production of cochineal in, and importation of it
“ from, Jamaica, the other West India islands, and his
“ majesty’s dominions in North America, considered as
“ three separate districts, between April 1765, and A-
“ pril 1766.” And that year, they, also, offered “ se-
“ venty pounds, in the division of forty for the first,
“ twenty for the second, and ten for the third greatest
“ quantities of cochineal, produced in, and imported
“ from, his majesty’s dominions in North America, the
“ West India islands, and the Bahama islands, be-
“ tween April 1766, and April 1767.” These were the
last premiums offered for this article. For at that period
they were discontinued.

These

These premiums were never claimed : nor is it extraordinary they should not. Since the notion, that the animal itself, or the plant on which it breeds, are produced spontaneously in North Carolina, is intirely without foundation : nor is it all certain, that either the one or the other would live and thrive in that country : as they are the produce of hotter climates : though there are other species of the opuntia found much farther north. With respect to our West India islands, the climate would be less dubious. But there is no good authority for concluding, the true cochineal was ever found in them : and, therefore, reason to believe it is not a native of them. And as to the species of opuntia on which this fly propagates, there is scarcely more ground to imagine it is indigenous in those islands : notwithstanding what a well known writer has said on this head. This matter is, therefore, attended with more difficulty than is likely to be encountered by proprietors of plantations in the sugar islands. They must procure the plant, and animal ; and learn an art respecting the treatment of both, that requires some skill and experience in the exercise of it ; before they can expect to reap advantages from this attempt : and it is well known they turn their views to easier, surer, and more extensive pursuits. In the Bahama islands it would be more suitable, if the country should prove favourable to the animal and plant : and it were to be wished, that this, and some other matters of a parallel kind, should be tried there. But without an auxiliary aid from some other quarter, in procuring the fly, plant, and instructions to manage them properly, the planters in those islands are not very likely to provide themselves with those requisites.

The *production of RAISINS in our American colonies*, was another of the early objects of the Society's views. The utility of this acquisition, could we obtain it, is sufficiently obvious. We consume great quantities of raisins ; and we purchase the whole of foreigners. The Society, therefore, in the year 1750, instituted the following premium. " To the person in any of our American colonies, who shall first raise, and cure, from his own plantation, and import into the port of London within six years, from the twenty-fifth of March 1759, five hundred pounds weight of good raisins, fifty pounds."

There

There was never any claim made for this premium: nor, as appears, any effort to obtain it.

This mode of premium appearing thus not effectual for the purpose; the Society, in the year 1762, changed it to the cultivation of the vines which produce raisins; and advertised as follows. "A premium of three hundred pounds will be given to the person, who shall, on the first of September 1767, have, or be possessed of a vineyard, or plantation, in any of the colonies upon the continent of North America, southward of the river Delawar, consisting of the greatest number of vines, not less than fifty, actually producing the true Malaga grape, from which the best raisins are made. And one hundred pounds for a like plantation, or vineyard, consisting of not less than twenty-five plants, producing the said grapes." The next year the Society advertised, that they proposed to continue these premiums to the year 1770.

These premiums do not appear to have had more effect than those from the raisins themselves. The neglect of this matter must be imputed to the difficulty of procuring, originally, the kind of vines required by the premium: which, together with the remoteness of profit, and the uncertainty of success in the undertaking, have discouraged persons from setting about it. The future prospect of this pursuit depends on the event of the vineyards now planted for wine. For the same unfavourable circumstances, above mentioned, that are found, with respect to them, would necessarily attend the grapes designed for raisins. The Society have, however, by the offer of noble premiums, endeavoured to incite a trial of this matter, as well as of the vines for wine; and have diffused such a knowledge of the utility of it, as must operate effectually hereafter, if the matter prove practicable, with regard to the natural fitness of any of our North American provinces, to produce grapes, on the vines carried from our continent.

The collection in our American colonies, of the GUM of the PERSIMON TREE, and the importation of it into England, were made another object of the Society's premiums. This gum is of the same nature with that afforded by the trees of the plumb kind: nor could I ever find to what use it was designed to be applied, except in the place of the gum arabic, or gum Senegal. However

ever, the Society, either in this view, or with some other intention, which was soon after forgot, offered, in the year 1760, the following premium.

“ A premium of two shillings and six-pence, for
 “ each pound, will be given to the person, who
 “ shall deliver to the Society, for their use, the first
 “ two hundred pounds weight of dry clean gum from
 “ the parsimon tree.”

To this advertisement, was added the following *nota bene*.

“ N. B. The parsimon tree grows in great abundance in swamps and other uncultivated places in America, from New York to Georgia: and when the
 “ branches of the tree are broken off, or incisions are
 “ made through the bark into the wood, the gum issues
 “ plentifully during the spring and summer months.”

In 1762, the advertisement was thus altered, the Society perceiving the other had not the wished-for effect.

“ For the greatest quantity of clean merchantable parsimon gum, not less than fifty pounds weight, that
 “ shall be produced from the parsimon tree, in any of
 “ the British colonies in America, and imported from
 “ thence into the port of London, twenty pounds.

“ For the next greatest quantity, not less than twenty
 “ five pounds weight, ten pounds.”

The next year these premiums were discontinued.

These premiums were never claimed: and the reason was, that they could not have proved advantageous to the persons, who should have been at the expence and trouble to have obtained them. The parsimon trees are frequently found wild in some parts of North America: but not in such numbers as to make the collection of this gum, in considerable quantities, easy. On a moderate computation, it has been estimated, by those who have tried what could be collected, that even in the present state, the expence of finding and gathering it, would not be less than three shillings per pound. But if so much were wanted as to render it an article of trade, it must be sought for at remoter distances from the settlements: which would still increase the cost in proportion. As gum senegal is sold for less than a sixth of this price; and there does not seem to be any use, or consequently vent for the parsimon gum, but in competition with that and gum arabic; it is no wonder, this matter has been neglected, or rather given up, after trial sufficient to afford

light

light to the undertakers, into the true state of the facts, respecting the advantage of it. The Society, however, on a more minute information of them laid aside the concern.

The attempt to the *preparation of ISINGLASS in our colonies in North America* was, likewise, thought a proper object of encouragement. It was at that time believed, that isinglass was prepared fish-glue: and that it was principally, if not solely, made from the cartilaginous parts of the sturgeon. As that fish abounds exceedingly in the rivers of North America; and it was imagined might very profitably, and commodiously be applied to this use; a premium to excite the proper trials was annexed to that offered in 1768, for the importation of pickled sturgeon here; and was advertised as follows: "There being reason to presume, that good isinglass may be made from the cartilages, skin, and membranous parts of the sturgeon, it is proposed to give, for the greatest quantity of Isinglass prepared in North America, and imported into the port of London, equal in goodness to the foreign, and not less than five hundred pounds weight, a premium of fifty pounds."

This premium was never claimed; as it was the next year withdrawn by the Society, in consequence of information, that the national end would be answered by other means. A person had taken out a patent for making isinglass in England; and had produced such specimens of his preparation, that the principal members of the Brewers company made a collection for him of a considerable sum of money, as an aid to his carrying on this useful undertaking. It was before well-known, that the isinglass was obtained, either wholly, or principally, from a species of a sturgeon called the *huso*, in the Volga Danube, and other rivers in the north-eastern parts of Europe: but this person demonstrated, that it was not a glue extracted by art; but the mesentery of the fish, cured or prepared in some peculiar manner in its entire state, which forms the isinglass. He asserted, that the mesenteries of other fish would answer the same end: and proposed to collect such a quantity of those of the cod in the Newfoundland fishery, as would supply the whole of our demand. On an application from him, the Society, unwilling to raise a rivalry against an invention, which appeared meritorious to the public; or to pursue unnecessarily an object

object where the occasion ceased; discontinued their premium for making isinglass in America: But, notwithstanding this specious prospect, the event has not equalled the pretensions. It is said by those, who have made repeated trials, that the mesentery of the cod has not the requisite properties of isinglass; nor answers well the purposes of brewers, or wine-coopers, in preparing finings; which makes the great consumption. Others say, that it is the difficulty in procuring quantities of this material, which has retarded the progress of its use. However it may be, the exclusion of the importation of foreign isinglass is not effected by this project: and it lies open to the Society, to resume the encouragement of any other method of producing isinglass in the British dominions. Whether those properties, that give the utility to isinglass, are peculiar to the mesentery of the huso; whether they might not be found in those of the common sturgeon, or other fish, though not in cod; or whether they are the effect of some method of preparation, which may affect the solubility, tho' it does not alter the form of the membranes in the true isinglass; is not hitherto well cleared up: But it would not be difficult, to obtain the knowledge of a matter, practised so extensively, and commonly, both in the Russian and Austrian dominions, where the isinglass is produced: and the method of preparation, when accurately known, might be easily tried on the mesenteries of all the kinds of fish, that are taken in large quantities. The great consumption, and high price of this commodity, render it an important object of regard.

The cultivation of HEMP in our American dominions was, likewise, thought a fit object of the Society's encouragement. The same reasons, which have been before advanced for the cultivation of hemp in Great Britain, hold equally good for it in the colonies. The Society, therefore, conceiving, the giving a large premium on the importation of it here from the colonies would be an inducement to the cultivation of it there, offered, in the year 1760, the following. " A premium of one hundred
 " pounds sterling, will be given by the Society to that
 " person, who, in one vessel, shall import from any of
 the British colonies in North America, at the Custom-
 " house in London, the greatest quantity of good and
 " merchantable hemp, fit for his majesty's service,
 not

“ not less than ten tons, the growth of any one of the
“ said colonies.

“ For the next greatest quantity, seventy-five
“ pounds.

“ And for the next, fifty pounds.”

These premiums were not claimed : nor can it appear probable they should, to those, who are more minutely informed of the relative facts. The American colonies are supplied from England with the far greater part of the hemp they use. The price of it, therefore, is much higher there than here. If, consequently, any person, who had produced such a quantity of hemp, as was required for the premium, had imported it hither, they would have sustained a loss by the difference of the price here and there, against which, the premium would not have indemnified them. The Society on a reconsideration of this subject, the next year, changed the mode of the premium ; and offered it on the production of hemp in America, without requiring the importation of it into England ; and they advertised thus : “ To any person
“ who shall, in the year 1763, within the bounds of any
“ part of the provinces of Nova Scotia, and New-Eng-
“ land, from land not before in the cultivation of hemp,
“ produce the greatest quantity of good merchantable
“ hemp fit for cordage, not less than twenty tons, one
“ hundred pounds.

“ For the next greatest quantity, not less than ten tons,
“ fifty pounds.

“ For the third greatest quantity, not less than five
“ tons, twenty-five pounds.

“ The like premiums will be given within that part of
“ his majesty’s American dominions, that lies between
“ Connecticut, East Maryland, and the Penſylvanian
“ territories, on Delawar south.

“ The like premiums will be given within that
“ part of his majesty’s American dominions, which
“ lies between Penſylvania north, and North Carolina
“ south.

“ The like premiums will be given within that part of
“ his majesty’s American dominions, which lies to the
“ southward of Virginia.

“ N. B. The first division contains the province of
“ Nova Scotia, New Hampshire, Massachusetts Bay,
“ Rhode Island, and Connecticut.

“ The second, New York, New Jersey, and Pennsylvania.

“ The third, the Pennsylvanian territories on Delaware, Maryland, and Virginia.

“ The fourth, North Carolina, South Carolina, and Georgia. No more than one set of premiums will be given within each of the divisions described.”

These premiums were again offered the next year, with this alteration only, that the word *Canada* was inserted in the advertisement between the words Nova Scotia and New Hampshire. They were continued thus to the year 1766, and then dropt.

These premiums were not, however, claimed : which must be imputed to the greatness of the quantity required. For, as well before, as during the time of offering them, less quantities of hemp had been cultivated by numbers, in various places. Indeed the government had taken provisional measures in the grants of land, in some colonies, that a certain proportion of hemp should be raised. It was proper, therefore, the Society should propose the premiums on such difficult terms, in order that they should not be gained, but by some extraordinary effort towards an advance of this article. It has been said, that the quantities required were more than could be practicably attempted : but this cannot hold of the least premium ; which demanded only five tons. And, indeed, the difficulty in the others lay only in the want of hands to manage the hemp after its maturity. There was a very extraordinary proof of this, in the instance of a gentleman in one of the colonies, who informed the Society, that he had raised, as he supposed, fifty tons of hemp ; but that, for want of people, and knowledge in the proper manner of reaping, and dressing, he lost almost the whole. The same impediment, as to want of knowledge, is one general cause, no greater progress has been made in so important an article. But it appears, as well from numbers of passages in letters, as from various repeated applications to the Society, from persons of great consequence in the colonies, that the furnishing information of such kind would be much more effectual than any premiums, in this, and other matters of a similar nature. In all such cases, where any proposed undertaking is shown to be profitable, and is rendered easily practicable by ample instructions, it necessarily carries with it its own

own inducement, and reward. The Society have nevertheless, done all that could be, in the way of premium to excite a spirit to apply to the cultivation of hemp : and, perhaps, hereafter, thro' their means, what else is wanting to this end may be supplied.

The production of OPIUM, in our North American colonies, was attempted to be introduced by the Society through the influence of their premiums. Opium is used in medicine ; but in greater quantities by those, who contract the habit of taking it on account of it's sedative or intoxicating qualities. This occasions it to be imported hither from the East, in a considerable quantity. It had been observed by some, that Georgia abounded with a particular species of poppy, which might be the same with the kind whence the opium is extracted in the East ; or at least might answer the same end for this purpose. At all adventures, it was not impracticable to convey the seed of the true Turkey poppy, affording the opium to our colonies ; and cultivate it there : The Society, therefore, as well to give an intimation of the utility of such an acquisition, as to incite some attempts to trials of this matter, advertised in the year 1760, the following premium.

“ There being reason to believe, that the true species of
 “ poppy, from which the best sort of opium is extracted,
 “ may be cultivated to advantage in some of our southern
 “ colonies upon the continent of North America, a pre-
 “ mium of two shillings and sixpence will be given for
 “ every pound weight of opium, equal in goodness to
 “ the best Turkey opium, imported into the port of Lon-
 “ don from the said colonies.

“ N. B. The best process or method of making Turkey opium is as follows :

“ When the heads of the poppies are nearly ripe, but
 “ yet soft and full of juice, make four or five incisions,
 “ with a knife, about half round the poppy head ; and
 “ from each of these there will flow a few drops of a
 “ milky juice, which soon hardens into a solid consistence,
 “ and is to be carefully scraped off, the next day, with a
 “ blunt knife ; and is the finest opium. The opposite
 “ side of the head is to be wounded, and the opium
 “ scraped off, the next day, in the same manner. If the
 “ heads be wounded in the morning, it may be scraped
 “ off in the evening.

“ After all the opium is collected, it is to be beaten or wrought upon a hard board with a little water, for some time ; and then formed into cakes, or rolls ; and dried for sale.”

In 1763, the advertisement was changed ; and the premium greatly augmented. The Society thought proper, to offer then, “ One hundred pounds for the greatest quantity of opium, not less than ten pounds weight, equal in goodness to the best Turkey, that should be produced in, and imported from, any of the British islands in that part of America commonly called the West Indies, into the port of London, before March 1764.”

“ For the next greatest quantity, not less than five pounds weight, fifty pounds.

“ And the like premiums are proposed to be given for opium produced in, and imported from the colonies of Georgia, South Carolina, and Virginia, considered as one district.”

The Society, the same year, advertised the same premiums of one hundred pounds, and fifty pounds, for the production of opium in any of his majesty's American dominions : which were continued to be offered to the year 1766 ; and then ceased. The former were dropt in 1764.

These premiums were never claimed ; nor does it appear, there were any attempts made towards obtaining them. It is certain now, that the wild poppy in Georgia is not the same with the Eastern : nor, in all probability, is that species to be found in America. One difficulty, therefore, is, the obtaining the seed of the Eastern poppy fresh enough to vegetate : though if this were the whole, it might be surmounted. But there is another impediment, in the present state of our colonies, to this, as well as to the cultivation of safflower, above-mentioned : which is the dearth of labour in North America. For the collection of the juice of the heads of the poppy, as described in the directions given in the Society's advertisement, would employ a great number of hands, to produce any considerable quantity : and, most probably, the expence of labour would be too great for the return. It were much to be wished, otherwise, that this article had under-

undergone actual trial. For, though the consumption of opium in England does not indeed render it a matter of high moment, yet there is a market, where a vent might be found for very great quantities. This is in the Malay countries in the East Indies; which the Dutch supply with this Drug, purchased, by them, in Bengal. They exchange it in some places for its weight in gold: and are said, on very good authority, to return three hundred thousand pounds *per annum* for this article. Were opium produced on cheap terms, there would be a certainty of disposing of very great quantities in the East: as has already happened in the instance of rice. One reason of discontinuing this premium was, some information given to the Society, that good opium was already produced in Carolina; of which a specimen very much resembling the Theban opium, was shewn. But, though that is now some years ago, nothing further is heard of it: and it is to be feared we must place this premature assertion to the account of the numerous mistakes, or delusions, which have happened among the North American colonists with regard to the pretensions of having obtained the drugs of the other continent, or of the more southern climes of America.

The production of CINNAMON in our West-India islands, was, also, another object of the Society's attempts. It is needless to explain the advantages of procuring the spices in our dominions, they are so palpably obvious.

The circumstance, that engaged the Society to turn their views to the encouragement of the growth of cinnamon in our colonies in the West Indies, was, the finding, on our gaining possession of Guadaloupe, and Martinico, in the late war, a great number of cinnamon trees, apparently growing there wild, and spontaneously. It was imagined, that some of these trees might be easily transplanted into, and propagated in our islands in that neighbourhood: whence we might in time supply ourselves with cinnamon. The Society therefore, offered, in 1760, the following premiums: "The true cinnamon tree having been found to grow, and produce good cinnamon, in the island of Guadaloupe; and there being no doubt, that under the same circumstances of

“ soil, and situation between the tropicks, it would prof-
 “ per equally well in other parts of his majesty’s colo-
 “ nies; the Society do offer, to the person, who shall
 “ in any other of his majesty’s colonies, within five
 “ years from the date hereof, raise, or plant, cultivate,
 “ and properly secure the greatest number of cinnamon
 “ trees, not less than two hundred; one hundred
 “ pounds. And, under the like circumstances, for the
 “ next greatest number, not less than one hundred, fifty
 “ pounds.”

This premium was continued to 1766; and then ceased. But while it was advertised, the Society, in 1762, thought fit to offer the other premiums for the raising cinnamon trees, which follow: “ A premium of one
 “ hundred pounds, will be given for the greatest num-
 “ ber, not less than fifty, of the plants of the true cin-
 “ namon tree, which now grow in the island of Guada-
 “ loupe, properly raised, or planted, and effectually
 “ fenced, secured, and cultivated, in any of the
 “ British islands in that part of America commonly
 “ called the West Indies, between January 1763, and
 “ January 1767.

“ And fifty pounds for the next greatest number, not
 “ less than twenty-five plants.

“ The like premiums will be given, on the same con-
 “ ditions, for the greatest number of cinnamon trees pro-
 “ perly planted, secured, and cultivated as above, in the
 “ Bahama islands within the same time.”

They were thus advertised to 1767; and then discontinued.

These premiums were never obtained, though there were several attempts made to convey the cinnamon trees; and establish them in our islands: and, also, to raise them from the fruit both there, and in the hot-houses here. There is somewhat, that renders this tree difficult to be raised by art; though it propagates itself freely in the places before-mentioned. It is undoubtedly not a native of those islands, but has been brought thither by the missionary priests: who have frequently passed from Asia to America; and have carried along with them the products of the Eastern world to the Western. But there was a great ground of presumption, that difficulties attended the production of cinnamon in these islands. As
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the French, who had among them some very able botanists in those parts, did not appear to have made any advantage of the cinnamon tree: which they certainly would have done, had it been easily practicable. For the trees must have been in these islands a long time. It was, nevertheless, a very proper object of the Society's attention; though their endeavours failed of success: as the least chance of gaining so important a point was well worth the trouble of offering a premium.

The procuring the introduction of the MANGO TREE into our West Indian colonies was, also, attempted by the Society. This tree is very general in the East Indies; and useful, not only as it affords the unripe mangoes for pickling, which make an article of trade; but for the ripe fruit, that is one of the most delicious and wholesome hitherto known. In both lights, it would be a valuable acquisition to our American colonies in the hot climates: and the Society, therefore, endeavoured to obtain the stones of the fruit from the East Indies, in order to send them thither: and for that end offered, in 1760, "A gold medal to the person, who should first bring to England some of the stones of the mango, not less than one hundred, in such condition, that being sent to the West Indies, by the Society, any of them shall be found to vegetate." The advertisement was continued to 1762; and then dropt.

This medal was never formally claimed. But several parcels of the stones have been given to the Society; and sent, by them, to the proper places in our colonies: particularly some, this present year, which appeared to be in a growing condition; and will be treated with great care, at least in one place. It was, several years ago, hoped, from authentic information, that this tree had been obtained in Barbadoes, in a perfect state; which happened from this circumstance. A naval commander, who was separated from a fleet, in the former war with Spain, put into the Brazils; and found mango trees flourishing there, which had been brought from the East Indies, by the missionary priests. He procured one of them planted in earth, in a tub; and brought it with him to Barbadoes: where it was planted in the natural ground: It grew eleven years barren; but, at the end of that time, bore fruit; from which, some young trees were raised.

What is become of the original tree, or those raised from it, I am ignorant. For, on inquiry, the fact does not appear to be well known in the island. But it is possible, the old tree, or the young ones, may be in a particular plantation, in some corner of the island, without being generally observed, or attended to.

The *importation of SILK GRASS into England*, was, also, made an object of the Society's encouragement. There are several vegetable substances, which pass under this name, in different places. They are mostly produced from the aloe; and those other kinds of plants, which have the same sort of succulent leaves. This particular species, which the Society had in view, was afforded by a kind of ananas, or pine apple, which much resembles the white pita, or penguin aloe; but is not the same. The fibres are very long; and, when manufactured, make thread, which has the glossiness of silk: but, in strength, far exceeds that, or any other filamentous substance whatever. It has, likewise, the quality of enduring to be soaked for a very long time in water, without rotting, being weakened, or otherwise injured. The Indians, in the neighbourhood of the Muskitto shore, use this substance for making their cloaths, hammocks, nets, cables, and indeed every purpose, to which thread or cordage can be applied. The Society were led to adopt this object, by a memoir, explaining its general and commercial nature, given to them, together with specimens of the silk grass in its crude state, as well as manufactured into thread, a hammock, and an Indian habit. They advertised, in the year 1760, the following premium.

“ Whereas it is well known, by experiment, that a
 “ very useful species of thread, or vegetable silk, commonly called silk grass, is produced from an American
 “ plant; it is proposed to give as a premium, for the
 “ largest quantity thereof imported into this kingdom,
 “ in a state fit to be manufactured, not less than one
 “ ton weight, collected by any of his majesty's subjects in America, or the West Indies; one hundred
 “ pounds.

“ For the second greatest quantity, collected and imported by a different person, not less than half a ton,
 “ fifty pounds.

“ For

“ For the third largest quantity, not less than five hundred pounds weight, twenty five pounds.

This advertisement was continued to the year 1765 ; and then dropt.

These premiums did not occasion the importation of any quantity of silk grafs here, as might have been hoped. Some alterations of the state of the British settlements on the Muskitto shore, which happened after the termination of the war: together with the absence of the persons who were properly situated to have pursued the Society's views, prevented any step being taken ; or, perhaps, even the knowledge of the Society's premiums from reaching the place. These obstacles are, however, now removed : and there only remains one ; which occurred, in consequence of trials made on specimens, at the time the Society appointed the premium. This was, that the same manner of heckling and dressing, as is practised for hemp and flax, did not suit this material. The Indians do not divide the filaments, but lay them together intire ; and twist them with their hands : by which, they form a thread perfectly uniform, even, and of great strength. This would be too laborious to be expedient here. But, there is no doubt, but that some means of rendering the silk grafs fit for spinning may be used. It is intended to supply the Society with such a quantity of this material, as may admit of its being put into several hands, to treat it in various ways, that the best method of manufacture may be discovered. When such a method is brought to light, the importation will again be a fit subject of the Society's premiums. As the establishing the use of this material here, would be greatly beneficial, from its exceeding strength, and resistance of putrefaction in water, which render it extremely fit for some very important purposes.

The *production of the SUCCOTRINE ALOES in our West Indian colonies*, was taken up, as a proper object of the Society's premiums. There are various species of the aloe plant that grow naturally in America : and a very considerable quantity of aloes, of a coarse nature, is imported thence, under the name of common, or Barbadoes aloes. But this kind is inferior, for medicinal purposes, to that brought from the East Indies, called *succotrine aloes* ; and not at all fit for some other purposes, in which there is a great consumption of that sort. There

can be no reason to doubt, but that the succotrine aloe would flourish in our West Indian Islands: and, as the preparation of the aloe is easy, and the price great here, it would certainly be an advantageous article of commerce. This matter would be the more easily practicable, because we have the plants in our botanical collections in England; from whence they might be easily had: and the propagation of them is very quick and certain. The Society, therefore, made choice of a very proper object in this article; and advertised the following premium in the year 1761. "To the first person, who shall raise, in his majesty's plantations in the West Indies, any number, not less than one hundred, of that species of plant, from which the succotrine aloe is prepared, fifty pounds."

In 1762, the Society reduced the number of plants required; and augmented greatly the premium. For then they proposed to give "one hundred pounds as a first premium, for planting not less than fifty of the plants; and fifty pounds as a second premium for the next greatest quantity, not less than fifty."

"The like premiums were, also, offered for the planting aloe in the Bahama and Bermuda islands." And the following *nota bene* was subjoined. "N. B. The plant of the true succotrine aloe may be procured from most of the botanic gardens about London."

These premiums were continued to 1767; but then dropt.

These premiums were never claimed: nor is it to be collected from any intelligence, that there has been the least attempt to cultivate the succotrine aloe in America. It is, nevertheless, a matter apparently important, and practicable. The great consumption of this kind of aloe in leather gilding, makes it a very considerable article of commerce: of which we might save the expence to the British community, if the production were established in our own colonies. This aloe may be easily had from London: and the labour required in the cultivation of the plant, and the preparation of this drug from it, is very moderate; and would not enhance the price beyond the due bounds; as has been apprehended in the case of opium, safflower, and some other articles. The process for extracting the aloe from the plant is simple, and attended with no difficulty or uncertainty. The leaves being
pluckt

pluckt from the plant, when of due maturity, must be gently squeezed by hands, or with some instrument; and the juice they contain will flow out. This juice must be placed, for a night, to settle; and the fluid must be then poured off from the solid seculencies which will have subsided to the bottom. It must be afterwards placed in the sunshine to evaporate and grow dry; and is then completed. Strong pressure must be avoided. It increases the quantity, but injures the quality.

The *production of SCAMMONY in our American colonies*, was another article of a similar nature, which the Society attempted. This medicinal drug is brought from the East, principally from Aleppo: of which place the best kind bears the name. The demand here for it is not equal to that of the succotrine aloes; but is yet considerable: and there can be no reason advanced, why the plant might not be cultivated; and the gum resin prepared from it in some parts of our colonies in North America. This is much facilitated, by our being now possessed of the true species of the plant. It was brought hither from Aleppo, by Dr. Russel, who, likewise, made himself master of the method of extracting the drug from it. It is so hardy, that it has flourished for some years in the garden of the London Museum. And some of the seed, being sent to a gentleman versed in botanical matters, in one of our American colonies, he raised plants; which have thriven well there. The Society were induced, by these reasons and facts, to offer, in the year 1761, the following premium. "Scammony, being a drug of great utility in medicine, and wholly purchased, by us at present, of foreigners; there is the greatest reason to believe that it may be produced, with advantage, in the more southern British colonies in North America; the Society, in order to procure the establishment of so material an article in his majesty's dominions, offer the following premiums.

"Twenty guineas will be given to the person, who shall first import the greatest quantity of scammony, not less than twenty pounds weight into Great Britain, and which is the produce of the British dominions in America, and equal to the best foreign.

"For the next quantity not less than fifteen pounds weight, fifteen guineas.

"And

“ And for the third quantity, not less than five pounds weight, ten guineas.

The next year the premiums were greatly augmented: and the advertisement altered as follows. “ For the greatest quantity of good merchantable scammony, not less than ten pounds weight, that shall be produced in, and imported from, any of the British colonies in America, into the port of London, between January 1763 and January 1765, fifty pounds. For the next greatest quantity, not less than five pounds weight, twenty-five pounds.” Those premiums were continued to 1767; and then the Society ceased to advertise them.

Along with these advertisements, the Society inserted in their book of premiums, printed separately for the use of the colonies, the following directions for the cultivating and preparing scammony.

Scammony is a medicinal drug, formed of the juice of the root of a plant, inspissated or dried to a hard consistence, by being exposed to the air.

The plant, which affords the true kind, is a species of the *convolvulus*, or *bind-weed*, called the *convolvulus Syriacus*.

It may be cultivated by putting the seeds about two inches deep in the ground, at the distance of about four feet: and when the plants rise, placing tall sticks near them, that they may creep up them, and be prevented from running together.

At the age of three or four years, the scammony may be procured from them.

The manner of obtaining the drug from the plants, according to the account given by Dr. Russel, in the London Medical Observations, who saw the practice in the East, is as follows. When they begin to flower, clear away the earth from the upper part of the root; and then cut off the tops of them, in an oblique or sloping direction, about two inches below where the stalks spring from it. Under the depending or lowest part of this slope, fix to each root a shell, or small flat cup of glass, or earthen ware, that the juice, running from the root, may flow into it, and be retained. In about twelve hours, when the whole of the juice will be drained out of the roots, take away the shells, or cups; and put the contents of several of them together. The matter, thus col-

collected, being kept in a dry shady place, will soon grow hard; and be scammony fit for use.

The drug, when pure, is light, and of a shining appearance when broken; but easily crumbled if rubbed between the fingers. The colour, while the pieces are intire, will, however, vary greatly from a deep black to a whitish yellow, in different parcels equally good.

N. B. The species of *convolvulus*, which produces the scammony, grows naturally on mountains, in a dry soil: and the leaves and stalks dye to the root every year.

These premiums and information do not appear, hitherto, to have had the desired effect. Indeed the quantity required was too large to be expected to be produced in the way of experiment. But there is reason to hope, as botanical and medicinal knowledge are now gaining ground in North America, and the plant is easily obtainable, that some proper person will make an attempt; and that the Society, though they have discontinued their advertisement of premiums for it, to make room for other articles, will, when called upon, be ready to give any reasonable assistance in this, as they have in correspondent cases, to promote the establishment of a matter first proposed by themselves.

The production of *BARILLA* in our North American colonies, was another, and a very capital object of the Society's encouragement. This is an alkaline salt, of the same nature, with respect to its uses, with pot-ash, and pearl-ash: and, like them, obtained by the incineration, or burning the ashes of some vegetables. But the alkaline salt of this kind, which is called the fossil alkali, is only afforded by some particular species of plants: principally those, which grow in or near the sea: The barilla is produced from burning the Spanish kali, an annual plant. We import a considerable quantity from Spain; and there seemed no reason, why the same might not be obtained in North America. if the plant were once introduced, so as to grow spontaneously; or were raised by art there. It is procured both ways in Spain, and other coasts of the Mediterranean: being both reaped from the wild product, and sown in tilled fields. As there are very large tracts of sandy shore, suitable to this plant, in our North American colonies; and it propagates itself with great freedom and vigour; there was reason to presume,

sume, that, if it was introduced in some such places, it would spread, as it is found to do on the shores of the eastern continent, in the climates not too cold for it. The plant not being to be found naturally in America, the Society had it principally in view, to encourage first the introduction of it there; and therefore offered in the year 1761, the following premiums.

“Whereas barilla, obtained by the burning Spanish kali, or glass-wort, is imported from abroad into this country, and is used there in large quantities for making hard soap, and glass, and for other purposes: A premium of fifty pounds will be given to the person, who shall sow the greatest number of acres, not less than fifty, with the Spanish kali, in any of his majesty's American dominions; and having raised the plant, shall burn it to barilla. And a premium of twenty-five pounds, for the next greatest number, not less than twenty-five acres.

“N. B. It is further required, that five pounds weight of seed, fit for sowing, be saved from each acre for which any claim shall be made on the Society.”

In 1763, these premiums were restricted to the British colonies upon the continent of America, to the southward of the river Delawar. The number of acres required, were to be planted between April 1762, and April 1765. The same premiums were, likewise, then proposed for 1766; and the next year they were continued for 1767. But, after that period, they were dropt.

Along with the advertisement, the Society published, at the end of their premium book for the colonies, a sett of instructions for procuring and cultivating the Spanish kali, and making the barilla; drawn up, at their request, by the same person who furnished the process for making pot-ash.

These premiums have not been claimed. But yet the advertisements of them, and the information of the method of producing barilla, have not failed of their due effect. There have been parcels of marketable barilla made in the colonies, and sold in London. Whether the persons who prepared this barilla did not use the Spanish kali at all, but some other plant, that affords fossil alkali by incineration: or whether they did cultivate the kali, but not in sufficient quantity to claim the premium, does

not

not appear. The cultivation of that plant, however; as it requires only the spreading the seed and reaping the herb; which yields both a considerable quantity of vegetable matter, and proportionable product of alkaline salt; would certainly prove profitable to the undertaker: and every acquisition of marketable alkaline salts, the product of our own dominions, would be a benefit to the public, for the reasons abovementioned with regard to the pot-ash and pearl-ash.

The *collection of Sarsaparilla Root in our colonies in the West Indies, and the importation of it into Great Britain*, was another article, the Society took upon them to encourage. The increasing consumption of this medicinal simple, found of the highest efficacy in many various cases, renders it an important object of commerce: and we are supplied with a great part of our demand from the Spanish and Portuguese dominions in America. At the same time, we have now settlements in the West Indies, where very large quantities may be obtained: and though it is to be principally collected there by the Indians, yet, as they do not require money for it, but take our manufactures in exchange, it would, consequently, be of advantage to the British trade, to be furnished with the whole of what we consume from thence. The representation of these facts, prevailed with the Society to offer the following premium, in the year 1762.

“ For the greatest quantity of good merchantable sarsaparilla root, not less than five hundred pounds weight, that shall be produced in, and imported from any of the British settlements, or plantations, in that part of America, commonly called the West Indies, into the port of London, between April 1762 and April 1764, one hundred pounds.”

“ For the next greatest quantity, not less than two hundred pounds weight, fifty pounds.

These premiums were, likewise, offered, on the same conditions, for the provinces of Georgia and South and North Carolina, considered as another district.

The advertisements for this article were continued to 1766.

These premiums were never obtained. But that was owing to the same circumstances, respecting the Moskito shore, as were before mentioned, on the score of the silk
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grafs. The affairs of our settlement there, which are now put on a different footing, will remove the obstacles to a progress in this matter : which may be possibly thus extended, so as to furnish the whole quantity of sarsaparilla we want. There have been twice, however, claims made on the Society for their premium, in consequence of parcels brought from our old colonies in North America. But though the kind of root produced for these claims finds a market here, the Society came to a resolution, that it was not sarsaparilla ; and that they are of opinion, that the true sarsaparilla does not grow in North America, in any part to the northward of Cape Florida : as they are now sensible there is not the least good authority for its ever having been found there. The substitution in our market of this false kind, which is a different plant from the true, and intirely destitute of its medicinal qualities, is a very momentous reason for encouraging the importation of the true kind ; which the change in our concerns on the Muskito Shore, it is hoped, will promote to the degree required.

The Society offered a premium, also, for *making Iron from BLACK-SAND in America*. They were, in 1763, informed by a person, who had made a trial of such sand, and produced good iron from it, of his experiments and success : which induced them to give him a gold medal ; and to advertise the following premiums :

“ For the greatest quantity of merchantable bar iron
 “ made of the black sand found in America, and im-
 “ ported into the port of London, not less than fifty
 “ tons, one hundred pounds.

“ For the second greatest quantity, not less than thirty
 “ tons, sixty pounds.

“ For the third greatest quantity, not less than twenty
 “ tons, forty pounds.”

These premiums were never claimed ; nor does it appear, that any work was ever attempted to be established for making iron of such sand in America. There are several works in Europe which produce iron from the same kind of sand ; and it may be wrought by forging malleable iron out of it without smelting : as appears as well from the practice in Europe, as the experiment of the gentleman in North America, to whom the Society gave the medal for his information. The intention
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of the Society, in their advertisement of this premium, must be conceived to be principally, the giving intimation, that this species of sand is a valuable iron ore. Because there could not be a want of pecuniary reward, to induce persons, properly situated, to undertake a profitable iron work. There are very large quantities of such sands in several parts of America : and, therefore, we may hope, that the Society's information on this head may yet, hereafter, have its intended consequences.

The Society proposed, likewise, a premium *for the producing SALTPETRE in America.* The same reasons, as were above enumerated for establishing saltpetre works in England if practicable, were urged as holding good with respect to America, by some ; but others did not allow the parallel. The difficulties and impediments, however, to the doing it, with profit, from artificial beds in England, on account of the rates in labour, are still greater in America. This matter, with regard to the production of nitre by art, may, therefore, on very just grounds, be deemed impracticable there. But there may possibly be natural beds of nitrous earth that may be wrought with some advantage. The particular reasons, on which the Society formed their intention of offering premiums for this object, were from information laid before them in 1764, of the discovery of a particular method of producing nitre, of which an account had, likewise, been before published in an American journal. The matter appeared utterly incredible, to those who understand clearly this subject. But the testimony seemed so good, that it could not be controverted with decency ; and the Society were prevailed on to give the supposed discoverer a bounty of fifty pounds ; and offered, in 1764, the following premium, as an encouragement to pursue the application of that method, or to discover any other.

“ For every thousand pound weight of merchantable
 “ saltpetre equal in goodness to the best imported from
 “ the East Indies, made in any of his majesty's dominions
 “ in America, and imported into the port of London in
 “ the year 1765, five pounds ; except the greater claims
 “ shall amount to a greater sum than three hundred
 “ pounds ; in which case the said sum of three hundred
 “ pounds, shall be divided among the claimants, in

“ proportion to the respective quantities imported by
“ each.”

The like premiums were proposed to be given, on the same conditions for saltpetre, made in any of his majesty's dominions in America, in the years 1765 and 1766 ; but immediately after that time they were discontinued.

This premium has not been claimed ; nor has any thing further been heard of the extraordinary method of producing saltpetre which gave occasion to its institution. There can be no doubt, but that the account was owing to some mistaken observation : as the production of nitre in such manner, and quantity, as was asserted, is repugnant to facts and principles known in consequence of the most ample experience. Whether there be any natural beds of nitrous earths that can be wrought to advantage any where, is much doubted by some, who have made the deepest inquiry into this subject. And the laying artificial beds, or collecting nitrous earths accidentally formed by old buildings, stables, dunghills, &c. as is practised in the places where saltpetre is now produced, could never answer in colonies where labour is even dearer than with us. The Society, therefore, have with just reason, on reconsideration of this matter, discontinued these offers of premiums for it.

The Society, also, advertised a premium for *the discovery of COBALT in our American colonies ; and its importation into England.* The reasons, before alledged for the advantage of a discovery of a cobalt mine in Great Britain, really held good with respect to our colonies in America. The Society, therefore, offered, in the year 1764, the following premiums : “ To the person who shall discover cobalt in his majesty's dominions in America, and shall produce one hundred pounds of the same to this Society, fifty pound.

“ N. B. Satisfactory certificates of the place where it was discovered, and of the probability, that a quantity may be had sufficient for a manufacture of zaffre, and smalt, will be expected by the Society.”

This advertisement was thus continued to 1767 ; and then dropt.

These premiums have not been claimed : nor is there any great probability they should. The chance of gain would

would certainly not answer the expence of opening mines with a view for cobalt alone ; at least without knowing the extent of the vein, and the good qualities of the product ; and there are few other mines in our possession in America, where we could expect to find cobalt. It may be provisionally useful, nevertheless to have propagated the notion of this mineral, and its utility. That if it should be any where found, a due attention, and examination may be given to it.

The Society have offered one premium for the encouragement of the British settlements, which are not in America. This was for *the importation of COTTON from AFRICA*. There had specimens of cotton been sent to them from Senagambia, which appeared, tho' not of the very finest kind, to be such as would be very fit for several of our manufactures. The Society were informed, likewise, that it could be collected, in any quantities whatever, at a low price, perhaps not exceeding a penny per pound. Some time ago, the scarcity, and consequential high price of cotton were a great detriment to our manufactures of that material ; and occasioned the necessity of laying open our ports to the importation of foreign cotton : in consequence of which we now purchase great quantities of foreigners. It would, therefore, be of public benefit to be furnished from our own settlements ; and also an important advantage to our manufactures of cotton, now very extensive, to be supplied cheaply with it. The Society, therefore, with great propriety, in the year 1767, advertised the following premium :

“ For the greatest quantity of clean merchantable
“ cotton ; the growth of any of his majesty's settle-
“ ments on the coast of Africa, imported by private
“ adventurers into any of the ports of Great Britain
“ in the year 1768, not less than ten tons ; a gold
“ medal.

“ For the second greatest quantity, not less than five
“ tons, a silver medal.

“ The like premiums, on the same conditions, will be
“ given in the year 1769.”

These premiums have not been claimed yet. But the advertisement is still continued : and it can scarcely be doubted, but that a branch of commerce so considerably promising profit to those who may engage in it, will be at length established.

These were the several articles, respecting the trade with our colonies, for which the Society have offered premiums before the publication of their list in 1767. On a deliberate view of them, they must from the soundness of judgment, and extent of knowledge, requisite to the selecting the objects, and conceiving the mode of promoting them, as well as from the importance of the views, and the liberality of the expence proposed, do great honour to the Society.

There is, in this class, only one instance of encouragement given in the way of bounty, for any matter where the Society have not advertised premiums relating to the general object. This was *for the applying in America the knowledge, acquired in China, of making a preparation of the root of a vegetable, which may be used as a substitute for SAGO.* Specimens of this production were produced to the Society; and approved of: and a gold medal was given to the gentleman who possess this secret, on his declaring it to be his intention, to carry this matter into actual practice.

Besides the method of encouraging improvements in the colonies, by rewards, the Society have, on various occasions, transmitted seeds, models of machines, specimens of deal boards, and information of various kinds, which has been requested: and it cannot be denied, that such means have been very conducive to the establishment, or improvement of several important concerns. It must, and indeed has been by the colonies themselves on several occasions, acknowledged, that they, as well as the mother-country, have received very great benefits from the Society's endeavours for their service.

Under the class of improvements relating to trade, must be included those, which the Society have endeavoured to introduce in the BRITISH FISHERIES. The first object, respecting fisheries, the Society took upon them to encourage, was, the *catching TURBOTS.* This branch of fishery is, in a manner, monopolized by the Dutch; who take the turbot in our seas, and sell them to us for a very great sum of money: to the amount, as some say, of sixty thousand pounds a year: and, according to others, much more. As turbot bear a considerable price, and have a constant market with us; there can be no reason given, why we might not take them ourselves; and save the money we pay for them. The only obstacle seemed, the

the want of knowledge of the proper method; which the Dutch have concealed with all possible caution. The Society, therefore, in the year 1762, offered the following premium.

“ For every hundred turbot, of five score to the hundred, not less in size than sixteen inches from eye to fork, caught with hooks and lines, by British subjects, and brought to London or Westminster for public sale, between May 1762, and the end of August following, and in saleable condition, fifty shillings.

“ Likewise, for every hundred turbot under sixteen and not less than ten inches from eye to fork, caught and brought as aforesaid, twenty-five shillings.

“ The said premiums, of fifty shillings, and twenty-five shillings, to be payable to the master of the vessel, within one month after the abovementioned four months.

“ But it is provided, that in case the general quantities taken during the time abovementioned, of four months, should be entitled, on the whole to more than five hundred pounds, the Society then limit the premiums aforesaid to that sum; and, in such case, the said sum of five hundred pounds, shall be divided in proportions, according to the quantities and size caught by each vessel.” No alteration took place in this advertisement, till the year 1764, when the Society augmented the premiums: “ offering then five pounds, under the same restrictions, for the first quantity, and two pounds ten shillings for the second, of a different size.” It was in this form continued to 1766; and then dropt.

These premiums have never been claimed. Though, it has been said, attempts have been made; and by the same methods as the Dutch employ. Possibly they did not succeed, from the want of experience, or habitual skill, which is sometimes requisite in the practice of such matters, even where the general method is known. The Society, however, are now possessors of a complete apparatus, and instructions for the management of it: which are kept for the aid of such as are desirous to make further attempts. There is a gentleman in the North of England, of an enterprising spirit, and well situated for such an undertaking, who has lately desired a model of the apparatus.

ratus. As he does not want perseverance, which is principally requisite to success in this design, it is probable, that with this assistance of information from the Society, he will effectuate their views: and the public will at length, through their means, obtain the benefit of this important acquisition.

The Society also attempted to introduce *the preparation of Stock-Fish in the British dominions*. Stock-fish is cured, by the exposure of fish to the air in strong frosts, without salting. It will keep for a long time: and being in a great degree free from salt, has an advantage in that particular, with respect to the health of seamen, over the common kinds of cured fish. It is much in use among the seamen of the northern parts of Europe; and would certainly be advantageous to ours, if they could be brought to like it. The Society, therefore, advertised, in the year 1762, the following premium, with the directions for curing stock-fish.

“ To every person, who shall, before December 1764,
 “ import into the port of London, any quantity, not
 “ less than one hundred pounds weight, of good and
 “ merchantable stock-fish, cured by British subjects, in
 “ any part of his majesty’s dominions in Europe or Ame-
 “ rica, and shall produce a sample thereof to the Society,
 “ not less than six fish, the sum of fifteen guineas;
 “ but, in case, there shall more than six candidates
 “ offer for this premium, then the sum of one hundred
 “ guineas, only, will be equally divided among all the
 “ candidates.

“ *The Method of Cure.*

“ The fish, being caught in winter, must be beheaded
 “ and gutted, and the blood carefully squeezed and
 “ cleansed from the back bone; then washed in salt
 “ water, and hung up in sheds, to be kept free
 “ from wet; and there to be frozen till they are per-
 “ fectly dry.”

This premium was thus offered to 1766; and then discontinued.

This premium has not been claimed; nor, as far as appears, any attempt made to the gaining it. The reason for this is, that our seamen shew a dislike to stock-fish; probably from their finding it more insipid than salt fish, to the taste of which they are habituated. A total discouragement arises hence to any undertakings to pre-
 pare

pare stock-fish: as it would be producing a commodity, for which there is no vent with us. It is to be regretted, however, that there is such an obstacle to the views of the Society, with respect to this matter: which would have procured advantages, in more ways than one to the public.

The *propagating* SCOLLOPS or FRILLS, was, also, encouraged by the offer of a premium from the Society. The intention was to produce this kind of shell fish, by making them breed in artificial beds; as is practised in the case of oysters. The occasion of such a premium, taking place, arose from a proposal made by a member, to attempt the increase of fish in general on the sea-coast, by stocking each part with such kinds as are not now found there: which, he presumed, would cause their breeding, and multiplying in the places where they were thus carried. The practicability of doing this with success, was disputed by some; and maintained by others. It was, however, in a general light, too much a matter of speculation for the Society to enter into: and, therefore, they confined their regard, to the pursuing it in this one instance of the scollops; which, being a heavy shell fish, could not remove again easily from the places where they were required to stay and breed, whatever disposition they might have to do it.

The Society, accordingly, in 1763, advertised, that “ a premium of thirty pounds would be given to the person, who should establish a bed, and lay alive therein, the greatest number of scollops or frills, of the large eatable kind, not less than three thousand, in any river, creek, or part of the shore, not further from London than fifteen leagues beyond Sheerness, or ten leagues beyond Harwich.

“ For the next greatest number, placed in a bed, in like manner, not less than two thousand, twenty pounds.”

These advertisements were discontinued the next year.

There never was any claim made on the society for this premium. Though, from the price of scollops, there seems reason to believe, it might have been gained with advantage to the undertakers: whether with any to the public, or not, the consequence alone must have determined. As it would have depended on the propensity or

repugnance in the nature of this fish to breed in beds; and on the relish, or indifference, that might have prevailed for it, if it had been produced in great quantity.

S E C T. VII.

Of Improvements that do not properly fall within the foregoing Classes.

BESIDES the above enumerated improvements in arts, or commerce, which the Society have endeavoured to promote by premiums, bounties, or purchases, there are some few others, that do not fall within any of the classes or divisions observed in the preceding investigation.

The encouraging MAPS *to be made of the several COUNTIES of ENGLAND, by actual surveys, with the latitudes and longitudes, the sea-coasts and bearing of the head lands in the maritime counties, and the levels and sections of rivers capable of being made navigable*, was embraced as a proper object of the Society's efforts. The importance of this pursuit, both with respect to the particular counties, and the furnishing materials for a complete map of all England, are too obvious to require any elucidation. The nature of this subject rendered it not proper to offer a premium of competition. Since the labour and expence of the candidates, had there been several, would have been very injurious to those who had not gained the premium: and perhaps even to those who had gained it: as the rivalry in sale of several maps of the same kind, would have diminished the profit arising from selling them. The Society therefore very rightly deviated, from their geneneral method of proceeding, in this case; and gave notice, they would enter into engagements, with any particular person in each county, who, being duly qualified, should first offer, that they would pay a stated sum to him when he should have compleated a map of such county to their satisfaction.

Accordingly, in 1762, they published the following advertisement:

“ The society proposes to give a sum, not exceeding
 “ one hundred pounds, as a gratuity to any person, or
 “ persons, who shall make an accurate survey of any
 “ county upon the scale of one inch to a mile: the sea-
 “ coast:

“ coasts of all maritime counties, to be correctly laid
“ down, together with the latitudes and longitudes :
“ and they desire to be understood, that they do not in-
“ tend, by this advertisement, to bind themselves to any
“ particular time for paying the same gratuity, that they
“ may be better able to procure satisfactory proofs of the
“ merit of such performance : and if any person, or per-
“ sons, do propose to make such survey, they are desired
“ to signify their particular intentions before November,
“ that the Society may not engage in greater expences
“ than shall be found convenient.

“ As a farther encouragement, the surveyor that will
“ give an exact, and accurate level, and section, of the
“ rivers in any county surveyed, that are capable of be-
“ ing made navigable, shall be entitled to an additional
“ gratuity.”

The advertisement was continued thus to the year 1766, excepting that in 1764, the following were inserted after the words, “ *sea-coasts*,” viz. “ and the bearing of the headlands from each other.”

In 1763, a claim was made, according to an engagement previously entered into by the Society, for a survey of the county of Dorset ; and allowed. There was another allowed in 1765, for a survey of the county of Devon. And, in 1767, there was a third, for a survey of the county of Derby.

The Society have thus procured to the public, complete maps of the counties of Devon, Dorset, and Derby, with the requisites demanded in their advertisements : and, though they have discontinued their advertisements, to prevent too great a multiplicity of applications, and avoid appropriating too great a part of their funds to one object ; yet it is probable, that an offer from any person well recommended, to make a map of one of the remaining counties, would meet with attention. At least, the example is set, and the utility displayed, by the maps already obtained : and this alone may possibly procure the rest to be performed, by the aid of private subscriptions, and the encouragement of the gentlemen in the respective counties.

The *importation of DEAL BOARDS, PLANK, or LOG* from our American colonies, was, in the year 1761, proposed as a proper object of the Society’s encouragement. The evident importance of it, necessarily engaged their attention to the application made to them. It appear-
ed,

ed, from the information of several gentlemen perfectly acquainted with the facts, as well as from actual specimens produced before a committee, that our colonies afforded several kinds of fir, or pine wood, similar, and equal in goodness to the best red or yellow deal, furnished to us from the northern parts of Europe. And also, that, at present, none but the white or inferior kind of deal was imported to us from our own dominions. The evident advantage of bringing the kinds that would produce a higher price with the same expence of freight and labour, evinced it to be a matter, which merited, that some measures should be pursued to give a due information of the circumstances, to those, who were properly situated to engage in this article of commerce. But, on endeavouring to frame a proper advertisement, it appeared, that the names of the respective kinds of deal varied so much in different provinces of the colonies, and had so little relation to those known here, that nothing distinct could be settled, as an object of a premium. The intention of offering any was therefore suspended: and it was resolved, instead of that measure, to send specimens of the kinds of deal in use here, with an account of the several prices of them, to each of the settlements where, it was presumed, the exportation of the correspondent kinds might be most beneficial. The design of this communication was, that general information being thus offered of what kinds of deal were demanded here, and of the prices at which they could be vended, an incitement, from the view of profit, ascertained by such clear facts, might be furnished to those, who had the means in their power to enter into this trade: so advantageous, moreover, to the public interest, both of the colonies and ourselves, if the very great sums paid to foreigners for timber, could be transferred to our American planters. This proceeding has not, nevertheless, appeared to have been followed with the success, that might have been expected from it. The reason of which, there is ground to believe, has lain principally, in the neglect of duly exposing the specimens to the public in the colonies, by those to whom they were sent. Certain it is, that very great benefits, which might arise to the whole British community, from the settling this article of commerce on a proper footing betwixt the colonies and ourselves, are lost at present: and, as there is great reason to believe, merely
from

from the want of the requisite information, and attention. The society, who sifted this matter to the bottom, endeavoured, by the most rational and feasible means, to remove the impediments to it. If they have failed in this point, from the deficiency of zeal in others, whom it more immediately concerned to pursue the same noble views, the public, as well the British as American members of the community, ought yet to entertain a due sense of obligation to them.

There was another object, of the same nature with the preceding, to which, also, the Society have been induced to lend their attention. Application was made to them, in 1766, from several coopers in very extensive business, to give assistance in promoting the *importation of PIPE STAVES from America, in the place of those now brought from Germany.* It appeared, on very good authority, that the quantity we take from Germany, principally from Hambourg, amounted to a very great national expence: and that the white oak, produced in Canada, was equally fit for the purpose, when properly treated; and could be afforded cheaper. But that an ignorant and injudicious management, with respect to the season for felling the timber, the curing it, and the dividing it, rendered the staves unfit for the uses, to which those kinds from Germany are applied. The committee, to which this matter was referred, being satisfied, that the giving just information on this head, to those, who, from the want of it, lost the advantages they had otherwise in their reach, might be of great service, assisted the coopers in settling a brief set of directions, in the following manner.

“ The staves imported from Germany, by the way of
 “ Hambourg, Stettin, and Dantzick, take from the port
 “ of London annually, at least one hundred thousand
 “ pounds: and it has been lately found, that the Quebec
 “ oak, made into staves, with a little care in the cleaving
 “ and preparing, will answer all the purposes of the
 “ German. As it will promote a considerable saving, as
 “ well as encourage greatly our own colonies, it is re-
 “ commended to them, and the merchants here, to take
 “ into their consideration the manufacture and importa-
 “ tion of the same, according to the German plan.”

“ For their immediate direction, and for the better pro-
 “ moting the same; the particulars are annexed, as to
 “ size,

“ size, &c. of the timber required from Quebec, and
 “ other parts of America. Any quantity of the same,
 “ corresponding with the following directions, will meet
 “ with a ready sale, and turn to profitable account.

“ To wit, pipe-staves, five feet six inches long, from
 “ five to seven inches broad, and one inch and a half
 “ thick at the thin edge.

“ Hogthead ditto, four feet six inches long, breadth,
 “ &c. as above.

“ Barrel ditto, three feet six inches long, breadth, &c.
 “ as above.

“ Heading, two feet six inches long, and as broad as
 “ possible.

“ The above must be all of white oak, free from sap
 “ and worm-holes. The greatest quantity wanted will
 “ be of those of four feet six inches long.

“ *Directions for cleaving the Staves.*

“ The trees are to be felled in winter; and, after be-
 “ ing cut into the proper lengths, must be quartered,
 “ and the staves cleft from the quarters, after the thin
 “ edge is taken off, which is the center of the tree; that
 “ part being not fit for use.

“ The proper method of quartering should be parti-
 “ cularly observed; which is by dividing the wood into
 “ four parts, by lines drawn as *radii*, from the center,
 “ at equal distances. The common method, of dividing
 “ the wood by parallel lines drawn cross the whole, from
 “ one side of the wood to the other, should be avoided.

“ Note, the timber which comes from America, in
 “ general, is rarely fit for any other purpose than to
 “ make into dry casks: being commonly red and black
 “ oak, cut too short and irregular, cleft too thin, and with
 “ the sap not taken out. Therefore, all the abovementioned
 “ timber being intended for tight cask, must be
 “ the best white oak; and being strictly conformable
 “ to the above directions, it will produce a price ac-
 “ cordingly.”

It was, moreover, recommended to the Society, by
 the same committee, to print these directions; and disperse
 them in America. But some gentlemen particularly in-
 terested in the affairs of the colonies, proposing to procure
 them to be inserted in the gazettes or journals published in
 America, the design of printing and sending them from
 hence was not carried into execution. How far this in-
 formation

formation has been diffused by the method proposed, does not appear from any further intelligence hitherto had of the event. But there can be no doubt of its beneficial effects, if the due means has been pursued. It were, therefore, to be wished, the Society had not trusted the affair wholly to the care of others: but joined their own endeavours to communicate this matter to the proper people, by dispersing a number of these papers in the colonies: particularly in Quebec.

There was another important object of the Society's pursuit, of which, they sought the attainment of the end, without regard to any premium or bounty. This was, the procuring to the public, the benefit of a *method of EXTINGUISHING accidental FIRES in houses*. There had, at the time this matter was started, lately been an uncommon number of such accidents: and a member of the Society, since dead, who had great zeal to do service to the public, had met with a pamphlet treating of a method of extinguishing fires. Finding it had been proved, by experiments publickly made, to be effectual, not only in the beginning of fires, but even when they have made some progress, he thought it might be rendered advantageous to the public, by being made known through the means of the Society. The extinction of the fires was performed by the use of balls, charged with explosive matter, and a fluid that has the property of damping fire; and provided with a match to fire the contents. These balls were to be thrown into the room on fire; and, bursting there, produced the effect, by their explosion, and the action of the damping fluid, which was dispersed by the explosion over the whole surface of the room, and quenched the heat. The pamphlet had been published by Mr. Godfrey, an eminent chemist, who introduced this method here; and had obtained a patent for the sale of the balls. The Society had these facts laid before them; and the pamphlet was produced and read to them: by which, as the method proposed appeared of very great consequence, and from good authority to be efficacious, they were determined to use their endeavours to bring it into practice. They were further informed, that the grandson of Mr. Godfrey, who had succeeded in his business, was master of the knowledge of preparing these balls: and even had some of them in his possession. On this intelligence, they formed a design of having the experiments tried before the public at large; and applied to Mr. Godfrey for

for his concurrence and assistance. He consented to furnish, at his own expence, the balls that should be wanted; and to attend and conduct the management of them. It was then resolved to build a proper edifice, at the Society's expence, three stories high, near some extremity of the town; which being set on fire, might give a full opportunity of observing the effects of the operation of the balls. This was accordingly done at a little distance from the end of Tich-field street near Marybone; and the building being finished, a quantity of wood, faggot, and shavings, were put into the rooms of the ground floor and first floor. Fire was then set to the combustibles, in both rooms at the same time; and when they had taken hold of the wainscot, the balls were thrown in; and had immediately their due effect. A part of the spectators, the whole being very numerous, who were not near the building, and, consequently, did not perceive how much the fire had gained upon it, before the balls were thrown in, expressed some dissatisfaction and doubt, whether the trial was fair or sufficient. On which, it was resolved to repeat it in the uppermost room. This second time, the fire was suffered to prevail in such manner, not only on the combustibles put into the room, which were in a copious quantity, but on the wood of the building itself, that the flame came strongly out of the chimney, and forced its way with great violence out of the windows. But, instantly, on the explosion of one ball thrown in, it entirely disappeared: and, on that of a second, not a spark of fire was found unextinguished by the spectators, who immediately went into the room. The flooring was burnt through: and the wainscot reduced to coal in many parts. This removed every surmise of doubt of the efficacy of the operation: and the Society confirmed, afterwards, the resolution the committee then passed, "that the experiment had answered, to the full satisfaction of every body." There can be no question made, but that this method will extinguish fires in the beginning, and, in many cases, even after they have burnt sometime. The only difficulty is how to procure the balls, at the times they are wanted. The Society intended, by this public demonstration of their efficacy, to induce, at least, such as are particularly liable to accidents of fire, to provide themselves with them: as there are many cases, in which they might have been used with
success

success. But, notwithstanding what they have done, and Mr. Godfrey's advertising the balls after this trial, very few have taken them. But when fires happened at that time, the populace called on Mr. Godfrey to attend with them himself. But, as fires are casualties, that do not threaten particulars enough to strike the multitude with a strong sense of apprehension, by degrees the whole of this exhibition of a remedy seems forgot. The Society, however, have shown to the public, that there is an easy method, by which fires may be extinguished, in many circumstances, though not in all: and it is to be regretted, that their generous endeavours for the public safety are not seconded, by some provision's being made for the application of this method on the proper occasions. If the balls were kept in some proper places, in each parish, as engines and buckets are, where recourse could be quickly had to them on any emergency, they might certainly be rendered preventive of some of those fires, that are extremely calamitous, and now so frequent.

S E C T. VIII.

C O N C L U S I O N.

ON the revision, which has been above made of the Society's proceedings, with regard to the number and choice of the subjects of encouragement in the several classes; the respective measures pursued for the attainment of the end; and the effects or consequences of those measures; it must be admitted, by every candid examiner, that their endeavours, and success, have been equally great with their plan; even considered according to the most extensive meaning conveyed by their title, of a *Society for the encouragement of arts, manufactures and commerce*. The extraordinary progress, so conspicuous to all, of the improvements in the *polite arts*, proclaims itself, how much has been effected in the concerns of that class.—The introduction, or advances of the cultivation of madder, lucern, burnet, the separated grass seeds, &c; the information, obtained, of the more expedient and profitable methods of culture in general; and the invention, or improvement of the drain plough, drill plough, ploughs for various other material purposes, chaff-cutter, machine for slicing turneps, and other important instruments,

ments, or utensils, subservient to husbandry, evince strongly the benefits gained with relation to the articles that fall within the class of *agriculture*.—The invention, introduction, or improvements of making carpets, crapes for hat-bands, and chip-hats like the Italian, marbling and embossing paper, quilting in the loom, knitting lace and lace mits or gloves; and other valuable arts or manufactures; as also, of those important machines, the crane, saw-mill, stocking-frame, tide-mill, wind-mill, spinning wheels of various kinds, machine for doubling worsted thread or cotton, comb-pots for wool-combing, cyder-press, silk-reel, &c; manifest amply the advantages procured to our commerce, in the class of *mechanical arts*.—The acquisitions relative to the preparing in England, verdigrise, varnish, zaffre, smalt, and white enamel; the making crucibles of both kinds; edulcorating train oil; dyeing cotton, and linnen; tanning leather with oak saw-dust; and dyeing leather red and yellow, in the Turkey manner; are instances how much the public interest has been promoted in the class of *chemical arts*.—The establishment in our American colonies, of the manufacture of pot-ash and pearl-ash; the introduction of that of barilla; as likewise of the cultivation of vines, both European and indigenous or native; constitute a most essential service done to the british community, in the class of *trade*. But these are only the more striking articles, selected from others, which might be enumerated, to demonstrate, how much the Society's encouragement has conduced to bring forth matters of the highest public utility.

They have now a much greater multiplicity of considerable objects in view, than ever before; as appears by their list of premiums for the present year: and the means by which they can operate for the attainment of them, are now, in consequence of experience and accumulated information, much better understood, and regulated. They have inspired an ardent spirit of general pursuit of improvements, as well as a keen attention to the discovery, or rendering perfect, many particulars which have already been brought into agitation. The future benefits of their yet unremitted efforts, will, nevertheless, in all probability, exceed those already reaped.

The grounds of expectation of future benefit from the Society's endeavours, will be, however, more satisfactorily

satisfactorily elucidated, by the explanation of the several articles, that now stand in their list of premiums; which will be given in the next volume of these Memoirs. This explanation will not only extend to the general nature of each subject, and the reasons which induced the Society to adopt it; but will comprehend, in most cases, instructions, or intimations, relative to the probable means by which the matter proposed may be effectuated. This, it is hoped, will much facilitate the operation of the premiums offered, and the consequential attainment of the object: and will, also, together with an account of the determination of the respective claims, and of other occurring applications for encouragement, form a continuation of this history of the Society.

A R T I C L E IV.

Experiments, and Observations on the DRILL and BROADCAST HUSBANDRY; and on the Culture of Corn, Pulse, Turneps, Lucerne, Saintfoin, Burnet, &c. communicated to the Society for the Encouragement of Arts, &c. in four Letters, by Sir Digby Legard; and inserted at their Request (1)

To Robert Dossie, Esq;

S I R,

THE Society for the Encouragement of Arts, Manufactures, and Commerce, have directed me to deliver to you Sir Digby Legard's letters, in order to their being published in the Memoirs of Agriculture, if you think proper.

By Order,

PETER TEMPLEMAN.

(1) The first of these letters was sent in claim of the Society's gold medal offered as a premium for the best sett of experiments and observations to determine the comparative utility of the Drill and Broad-cast husbandry applied to barley: which was accordingly adjudged to Sir Digby Legard.

R

To

To the Society for the Encouragement of Arts, Manufactures, and Commerce.

GENTLEMEN,

1763.

THE following experiments on barley, executed last year, together with an account of different methods of cultivating that grain, are offered you by a candidate for your sixty-ninth premium. I presume, my having given the substance (2) of these experiments to Mr. Mills, to be inserted without my name in the last numbers of his Book on Husbandry, will not be thought an objection to my offering the same to you on this occasion.

I wish it were in my power to determine precisely the most profitable method of culture: but since several years experience, and the most careful observations I have been able to make, have not been sufficient to clear up my own doubts, I shall not presume to dictate to others; or to speak very positively on so nice a subject: I would reject the most plausible theory, if unconfirmed by experiments. And even experiments themselves, if they are not executed with care; often varied in different soils, situations, and circumstances; and repeated several years; are too apt to mislead. It is both a very important, and difficult task, which the advocates for the new husbandry have undertaken, to overthrow entirely the old system of fallowing, and dung; nay even the more modern introduction of turneps and clover (a system which the industrious farmer has long found abundantly sufficient, if not to acquire riches, at least to enable him to maintain his family;) in order to introduce the more fashionable scheme of pulverization; asserting confidently, that nothing more is necessary in order to create an immense, and lasting fertility, in almost every soil, than thoroughly to break and divide the earth. But the assertors of a new doctrine are apt to be too sanguine. Let us beware of being imposed upon by novelty; or of preferring ingenious to useful discoveries.

(2) What is said here of the publication of the substance of these experiments in Mr. Mills's *System of Husbandry*, relates only to the first letter. The contents of the three subsequent ones have not been before published.

ries. I am the more inclined to communicate to you these experiments of last year: because I think the comparison less favourable to the new husbandry in that, than any other years wherein I have made experiments. For I would allow every advantage to old customs, that they can naturally or reasonably claim.

Five acres of an inclosed field, the soil of which is naturally pretty rich, but light, and dry, inclining to a hazel mould, and nearly of equal goodness throughout, was destined to be sown with barley: part according to the old, and part to the new method of husbandry, in order to ascertain the most advantageous method of culture. This land had borne four successive crops, viz. one of barley, two of wheat, and one of turneps; was disposed in beds from the first; and had been horse-hoed every year; but it had never had any manure; except that the turneps had been eaten off by sheep. On the 26th of April 1763, half an acre was sowed by hand, in the random way; and took five pecks of seed: and half an acre was drilled, in equal distant rows, one foot asunder; and took three pecks. Two acres were drilled on ridges or beds, five feet broad, in double rows, eleven inches asunder, and four feet one inch interval to be horse-hoed; and they took six pecks. Two other acres were drilled, on five feet ridges, in treble rows, seven inches asunder: and took four pecks.

N. B. I feared, at the time of sowing these last two acres, that the seed had been too sparingly dispensed: but the plants branched so much afterwards, that the rows seemed tolerably compleat.

The above five acres had but one plowing: viz. just before seed-time after the harvest, 1762. On the 30th of May, the first horse-hoeing was performed, on the four acres, sowed in ridges, with M. Du Hamel's one-wheeled plow. But, on account of the rows being drilled unevenly, this could not be done very regularly in some places: the plow coming so near the rows as to tear out some plants, and cover others with mould; and in others going at too great a distance from the corn. To remedy this, in some measure, the rows so covered had the earth raked off: and another horse-hoeing was given on the 7th of June; the earth being very dry. By this last operation, the first furrow was cut deeper: and the plow went at a proper distance

from the rows. On the 8th of June, all the five acres were hand-hoed. But, by reason of the dry season, not many weeds had sprung up. The effect of the horse-hoeing on the four acres was great: and the corn seemed to flourish exceedingly. The plants were of a deep green; and remarkably vigorous. The part drilled in equally distant rows without intervals remained always of a paler green. But the part sown in the common way was a degree still paler; tho' this last part ripened the earliest; the drilled half acre next; and the four horse-hoed acres last of all. The third, and last horse-hoeing was performed in the beginning of July. This turned the earth towards the rows; and left a furrow in the midst of the intervals.

On the 31st of August 1763, the half acre sowed by hand, and the half acre drilled in equal distant rows, were mowed. The first produced twenty-seven stocks; the latter thirty-one stocks and eight sheaves: and the straw was stronger, and the ears larger, in the latter than the former. On the 15th of September, the four acres, that had been horse-hoed, were mowed. The ears were far from being equally ripe, because the extreme wet season had caused several fresh shoots at the time, the first, and principal, were ripening. The two acres drilled with treble rows produced ninety-four stocks and four sheaves. But the seed was sowed too thin; and, in consequence, there were several vacant spaces in the rows: and this was certainly some diminution of the crop. The two acres drilled with double rows produced ninety-five stocks. The ears of barley throughout the four horse-hoed acres, were surprisingly large. Several contained thirty-eight grains each (which is uncommon, at least in my neighbourhood.) I believe the number of grains, in an ear, were, at a medium, about thirty.

The many violent storms of wind, and rain, had lodged the corn in many places. I had some barley, this year, sown by hand on fresh and good land; which was so lodged in those places, where the land was the richest, and the corn thickest, that the greatest part was wasted. Nevertheless, though the horse-hoed barley inclined every way, owing to storms, in various directions; and intirely covered the four intervals, so that no land could be seen; yet were the stalks only bent,

but

but no ways injured : and this is one great advantage, which horse-hoed corn has over that sowed at random. For, though the ears are very large, the stems are proportionably strong, and hard; and, being constantly exposed, by means of the broad intervals, to the influence of the sun and air, they acquire such a degree of firmness, as generally to resist all attacks of wind and rain. The only inconvenience attending those bent stalks was, that they were difficult and awkward to mow; and, by covering the intervals, prevented their being sown; and deprived me of a good crop of turneps. For I have generally sown turneps in the intervals, immediately after the last horse-hoeing, about the beginning of July. The land is then reduced to excellent tilth; and nothing more is necessary, than to sow the seed pretty thick. The first shower of rain washes it into the ground, and covers it, without the aid of the harrow. The young plants enjoy the benefit of the fresh tilled earth; and, the corn being reaped, soon afterwards, the whole field is left for the turneps to extend their roots in it. I have had near as good crops of turneps this way, as when the land was occupied by that plant alone. On the 22d of September the produce of those parts, sown by hand, and drilled in equally distant rows, was threshed; and yielded as follows: viz.

Qrs. Bu. P.

Twenty-seven stocks of the half acre, sown	}	2	7	2
by hand, yielded - - -				
Thirty-one stocks and eight sheaves of the	}	3	1	0
half acre, drilled in equal distant rows -				

December the 17th, the produce of the four horse-hoed acres was threshed, and yielded as follows: viz.

Qrs. Bu. P.

Two acres sown with treble rows, produced	}	6	2	0
ninety-four stocks four sheaves, yielding,				
Two acres sown with double rows, produced	}	6	3	0
ninety-five stocks, yielding - - -				

It appears, from the above experiment, that	}	12	5	0
four acres drilled, and horse-hoed produced				
Deduct for the quantity of seed sown, viz.		0	2	2

There remains, net produce on four acres	12	2	2
	R 3		Half

	<i>Qrs.</i>	<i>Bu.</i>	<i>P.</i>
Half an acre sown at random produced -	2	7	2
Deduct for the quantity of the seed sown, -	0	1	1
Remains net produce on half an acre -	2	6	1
Half an acre drilled in equal distant rows, } produced - - - - -	3	1	0
Deduct for the quantity of seed sown -	0	0	3
Remains net produce on half an acre - -	3	0	1

Perhaps the difference may appear more clearly, if stated in the following manner, viz.

	<i>Qrs.</i>	<i>Bu.</i>	<i>P.</i>
Old method, total net produce of one acre is -	5	4	2
Total net produce of one acre, sown in equal } distant rows - - - - -	6	0	2
New method, total net produce of one acre } drilled and horse-hoed - - -	3	0	2

In the above experiment, it is to be observed, that the land of both these trials was, as nearly as possible, of equal goodness, and in equal order, lying contiguous in the same field. The seed-corn of both was exactly the same, and all sown on the same day. So that the difference in the produce of each acre must be attributed to the quantity of seed sown, the manner of distributing that seed in the earth, and the culture bestowed on the plants whilst growing. It is evident, however, that the land in the old produced nearly double to that which was cultivated in the new way. But the greatest produce was from the land sown with the drill plow in equally distant rows, one foot asunder: Yet are we not from hence to determine too rashly in favour of either method.

I own from the appearance of the crop, whilst growing, and even after it was reaped; I did expect, that the quantity from the four horse-hoed acres would have been more considerable. Indeed I can account for some diminution of the crop, from the following accidents, viz. The horse-hoed corn ripened unequally, owing (as was before observed) to the excessive wet season; and, as it was later reaped than the other, it was more exposed

exposed to the depredations of sparrows, and other birds, which certainly got part of. And being first carried into a Dutch barn, and removed some time afterwards into a common barn to be threshed, there was not only a loss by scattered seed in the removal, but, likewise, by pigeons, which devoured a good part: having a constant and free access to the tops, and sides of the barn, where it was first deposited. Whereas the produce of the parts, cultivated in the old way, and drilled in equally distant rows, was carried into the barn, and threshed immediately; and, therefore, not liable to the ravages of vermin, or to any other loss.

But it must be allowed, notwithstanding from this experiment, that the advantage appears to be on the side of the old method. On the other hand, although six quarters on an acre is confessedly a very large increase from land sown in the common manner, yet is it no less true, that this great fertility was, in a considerable measure, owing to the excellent culture bestowed on it by the horse-hoeing method. Constant tillage, during the four preceding summers, had undoubtedly supplied the place of manure: and four successive crops, which were none of them bad, were so far from having exhausted the earth, that there seemed to be an increase of vegetable food. The soil appeared so thoroughly divided, that, since the harvest of 1763, the above four acres have been drilled with wheat at once plowing; and promise a good crop: the ridges being now where the furrows were last year. But those parts, which were sown at random, and in rows, have been manured at the rate of sixteen loads of stable-dung to one acre, in order to recover their lost fertility: and it was necessary to sow some kind of meliorating crop, to make this part of equal goodness with the rest of the field. It has accordingly been plowed into five feet ridges; and drilled this April with white peas, a double row on each bed; and is intended to be horse-hoed.

I cannot help observing here, that, were I to follow M. De Chateauvieux's method (although in most instances I am proud to follow the example of so able an experimenter;) and compute the produce of several years on the footing of the above horse-hoed crop; reckoning the land in the old way, to bring a crop only once in two years; the advantage would be greatly in favour of

the new method : even supposing every crop, in the old, at the rate of six quarters to an acre. For the expence of manure and tillage in the fallow year are infinitely greater than the horse-hoeing expences. But if England be so much superior to Swisserland in goodness of soil ; or if our farmers are so much more skilful than theirs, that we can, in the common management, I mean the rise of turneps, clover, rape, &c. have a beneficial crop every year ; I should be inclined to doubt, whether the very superior advantages, which some writers attribute to the horse-hoeing husbandry, may not be more imaginary than real. Not but that I think, there are several circumstances to recommend it ; and that it may be followed in some situations to great advantage. As where the difficulty of procuring manure is very great : or where the distance of the plowed field from the farmer's habitation would make the carriage too expensive. There are, also, some soils more peculiarly adapted than others to the new husbandry ; as requiring an extraordinary degree of pulverization ; and some vegetables are particularly improved by bestowing a culture on them whilst growing.

I should, therefore, be concerned to find, that any one was deterred, by what I have said, from making, or continuing their experiments in the new husbandry. My experience is much too small to determine absolutely the comparative excellence of the two methods.

I have, however, so good an opinion of Mr. Tull's system, that I have already continued the practice of it for five or six years ; and have tried it on several kinds of vegetables ; and in a pretty extensive manner. I propose to continue my experiments, to extend, and to vary them. Perhaps, at last, I may be able to ascertain, whether, or no, the horse-hoeing scheme be superior ; and in what degree.

There is one prejudice commonly adopted against this method, by the inexperienced, viz. that it is very expensive ; which is entirely groundless ; as will appear by attending to the following particulars. The two-wheeled drill-plow, invented by Mr. Tull (which I can recommend as a good instrument, having had several years experience of it ; and some hundreds of acres drilled with success) may be made compleat with wooden seed-boxes for fifty shillings. Mr. Duhamel's one-wheeled plough

plough for horse-hoeing costs thirty shillings. But this last, though very useful, is not absolutely necessary. For the common plow, without wheels, will perform all the operations of horse-hoeing. Those two instruments may be easily made, and repaired, by a country wheelwright. I have several made in the village where I live, at the aforesaid prices, which were very perfect; and have lasted several years. It is true, I make use of some other instruments, which may be said to be appendages of the new husbandry: as they have been contrived by the practitioners of it. But the five-coultered plow, the single, and double cultivators, &c. though extremely convenient to those who practise this method in a very extensive manner, are, by no means, necessary in making trials, or small experiments.

After the first year, that is, when the land is reduced into fine order, one horse is generally sufficient to turn a furrow, either to or from the rows: and, as a man and horse can, with ease, horse-hoe four acres in a day, it cannot cost more than one shilling to horse-hoe an acre; even including the repairs of the instruments: nor are more than four hoeings commonly required. So, if we reckon four shillings for plowing the ground once over, or forming fresh ridges; four shillings more for horse-hoeing; two shillings and six-pence for hand-hoeing; two shillings for weeding; and six-pence for drilling; thirteen shillings is the whole expence of managing an acre in the new method.

Such, therefore, being the case, with which this celebrated method is performed; so great the improvement of the land by it; and such the extraordinary effects produced by merely stirring the earth; one would think, every husbandman should be induced to give it a fair and candid trial; and as there needs not the exaggerated encomiums, which its partizans have affected to bestow on it, on the one hand: so, on the other, the inveterate prejudices, which prevail in many against this system, as they have no foundation in truth, must prove subversive of the interests of agriculture.

SIR,

SINCE the letter I wrote to you, in 1763, I have continued my experiments in husbandry; and, as I think, the further observations I have made on the culture of barley,

barley, may render the experiments, which I sent you to lay before the committee of agriculture, more complete, I beg leave, through your means, to add the following by way of supplement to my former letter. Not doubting but you will be careful to conceal the name of the author, until the Society shall have determined its merits.

Ganton, near Malton,
Yorkshire, Nov. 1, 1765.

I am, SIR, &c.

To the Right Honourable the President, and Vice Presidents, of the Society for Encouragement of Arts, Manufactures and Commerce.

Nov. 1, 1765.

GENTLEMEN,

THE experiments, which I had the honour to lay before you, in 1763, in order to determine the most beneficial method of cultivating barley, were, I fear, not intircly satisfactory: at least they were not so to me. I must beg leave therefore, to add the following, as a supplement to my former letter.

However doubtfully, I might expers myself, in that letter, with regard to the excellence of the drill, and horse-hoeing culture (not having, as I thought, at that time sufficient experience to determine a point of so much importance) two years careful observations have since enabled me, to speak more positively, and have made me incline much more to the side of the drill system. Nor have my experiments been confined to barley. I have cultivated wheat, for several years, with success; and have applied the horse-hoeing husbandry to beans, pease, oats, turneps, potatoes, sainfoin, and lucern; and the effects of horse-hoeing have been so constant, and uniform, in the cultivation of all those vegetables, that I have no doubt, but that this method, if executed with care, attention and perseverance during a term of years, will prove much more advantageous than the old method.

The same field in which the experiments on barley were made (as before related in 1763) is now sown with wheat, the eighth successive crop. Of which four crops have been wheat. The two last of these have each produced near two quarters of wheat per acre: and the land is so far from being exhausted, by so many burdens, that

that it seems yet in perfect heart ; though no manure has ever been laid upon it.

I have now practised the drill culture about eight years : and, from the most careful observations, I have been able to make, I judge, that twelve bushels of wheat on an acre is about the medium quantity to be obtained from moderately fertile ground, during, at least, six successive years, without dung. I reckon eight bushels to the quarter, and nine gallons to the bushel. Now, if this be a true position, I think it will not be difficult to prove, that the drill culture is more beneficial to the farmer than any other method hitherto invented.

After I have related the two last years experiments in barley, I shall give a comparative view of the expences, and profits, attending the cultivation of land in the old and new way : and I shall calculate the profit in the old way ; not according to the management in use, in the time of our ancestors ; but according to the best modern improvements : taking the account from some celebrated modern practitioners, as related by themselves.

A comparison of this sort is not so properly made betwixt the old and new husbandry, as betwixt the modern improvements, adopted by the common farmer, and the benefit peculiarly arising from the drill and horse-hoeing system. That the latter is founded on just principles, I am convinced : and that the practice of it (if any credit be due to the actual experiments of its professors) ought to be esteemed one of the most considerable improvements in agriculture.

On the 26th of April 1764, two acres and a half were drilled with barley on ridges four feet and a half broad ; viz. a double row ten inches distant on the top of every ridge, the intervals for horse-hoeing being three feet eight inches broad ; and took two bushels two pecks of seed. One acre adjoining, and of equal goodness, was, on the same day, drilled with barley, in equally distant rows one foot asunder, and took two bushels of seed. One other contiguous acre was, at the same time, sown in the broad-cast manner ; and took two bushels one peck of seed. All the land was as near as possible of equal goodness ; of a light and dry nature ; viz. a good hazel loam, worth fifteen shillings per acre.

This

This field had borne a good crop of oats, viz. six quarters per acre, the preceding year, on once plowing.

N. B. It had been twenty years in grass.

Two plowings had been performed since the oat crop: viz. one in the autumn, and the other in the spring. The horse-hoed part had three hoeings given at proper times; and was once hand-hoed. The one acre drilled level could not be hand-hoed; because sainfoin had been sown in the partitions betwixt the rows of corn: and it is to be observed, the want of this hand-hoeing deprived the barley of a very material advantage. The acre sown broad-cast was, also, laid down with sainfoin; and was not weeded.

The horse-hoed corn, as well as the level-drilled, and broad-cast, were cut on the 18th of September.

	<i>Qrs. Bu. P.</i>		
The produce of two acres and half horse-hoed was when threshed	}	10	5 0
The produce of one acre drilled in equally distant rows		4	4 0
The produce of one acre sown broad-cast		4	2 1

The horse-hoed crop may be esteemed a great one: as it produced four quarters and three bushels to an acre. The corn was also superior in size and goodness to the other; and was sold immediately for one pound five shillings per quarter. Some ears contained thirty-eight grains. This crop suffered a diminution from some horses breaking into the field, and eating several rows, just at the time of its getting into ear. But as the two other acres of experiment were injured by the corn being lodged, in some places, by storms of wind, and rain, these accidents might nearly balance each other.

On the 4th of May, 1765, the two acres and a half, just mentioned to have been horse-hoed the preceding year, were again drilled with barley after two plowings, to form the ridges; and took two bushels one peck of seed. These were horse-hoed, and hand-hoed; and, in short, managed in every respect as in the former year.

This crop was reaped on the 13th of September; and threshed the 22d of October. The produce was ten quarters of fine and clear corn, sold at one pound two shillings and six-pence per quarter. The adjoining land, where the last year's experiments were made, could

not

not be sown this year with corn, by reason of its being occupied by a crop of sainfoin; which now looks very promising. But I observe, that this year my crops of barley in general, on my best land, do not produce more than four quarters four bushels per acre. But, taking my barley crops at a medium for the last three years, the produce has been four quarters on an acre, in my best fields, sown broad-cast; and taking the horse-hoed crop at a medium for the best three years, the produce has been three quarters six bushels and three pecks.

In the following comparison, therefore, I shall calculate each year's crop, both in the old and new way on the above footing.

It is impossible to be very exact in this kind of calculations. But, I sincerely believe, that there is greater probability of reaping four quarters on an acre, in the horse-hoeing husbandry, than five quarters in the common way, on such a soil as I have made my experiments on. It has been usual to reckon, that the farmer ought to make three rents of his land. One third of which goes to his landlord, another to the expences of cultivation, and the remaining third to the maintenance of himself and family. But we will allow, that the art of husbandry is so much improved, that an intelligent farmer may receive above a third clear profit. One cannot precisely determine what the profit is; which varies probably in every county; and depends so much on circumstances, and situation.

I shall, therefore, set down a course of husbandry frequently observed by farmers in my neighbourhood, where the fields are inclosed, and let for fifteen shillings an acre, tithe free.

An estimate of the expence and profit of one acre in four years.

	£.	s.	d.		£.	s.	d.
First year, for turneps, costs	3	16	6	viz.			
Four plowings at 4s. each,	-	-	-		0	16	0
Harrowing and seed,	-	-	-		0	2	0
Hoeing the turneps,	-	-	-		0	6	0
Fifteen loads of dung, at 2s. 6d. per load,	-	1	17	6			
Rent,	-	-	-		0	15	0
					3	16	6
The first year's produce, turneps worth	-	2	0	0			
							Second

Second year, for barley, costs			£	s.	d.	
			1	13	0 viz.	
				£.	s.	d.
Two plowings, and harrowings,			-	0	10	0
Three bushels of seed barley, and weeding,			-	0	8	0
Rent,			-	0	15	0
				1	13	0
Second year's produce, four quarters of barley,			} 3 12 0			
at 18s. per quarter,						
			£.	s.	d.	
Third year, for clover, costs			0	19	0 viz.	
Fourteen pounds of clover seed, and rent,			-	0	19	0
Third year's produce, two crops of clover worth			1	10	0	
			£.	s.	d.	
Fourth year, for wheat, costs			1	18	0	
One plowing, and harrowing			-	0	7	0
Three bushels of seed, and weeding,			-	0	16	0
Rent,			-	0	15	0
				1	18	0
Fourth year's produce, three quarters of			} 5 8 0			
wheat, at 1l. 16s. per quarter, is						
Total produce on four years,			-	12	10	0
Total expences of one acre in four years,			-	8	6	6
Clear profit in four years,			-	4	3	6

I have not computed the value of the straw. Because it is supposed, that the expences of reaping, threshing, and carrying to market, will be nearly equivalent in this neighbourhood. In other places, where the value of straw may be thought greater or less than the expences, the calculation may be made accordingly.

New Method.

	£.	s.	d.
Three quarters, six bushels, and two pecks of barley on an acre, at 18s. per quarter, is worth,	3	8	7½
Deduct for expences, viz. Two plowings 8s. Three horse-hoeings, 3s. Hand-hoeing 2s. 6d. Seed 2s. 1½d. Rent 15s.	1	10	7½
Remains clear profit in one year,	1	18	0
Consequently the clear profit on one acre in four years, is	7	12	0

It appears from the above estimates, that the profit is considerably greater in the drill than the old method; yet I have supposed the fourth crop in the old way to be wheat. Whereas it is much more common hereabouts, where the land is not perfectly adapted to the culture of wheat, for the farmer to sow oats, or some other spring crop, after the clover; and thus is the profit reduced: but I proceed to consider the calculation of others.

A letter in the 3d volume of the *Museum Rusticum*, page 332, signed Y, reckons the clear profit of land in tillage near Bury, at about fifteen shillings per acre, According to my calculation, as above, the clear annual profit is one pound one shilling, in my neighbourhood, in the old way. But a very ingenious treatise in the 5th number, in the *Foreign Essays on Husbandry*, page 322, recommending the culture of sainfoin, and clover, with intermediate crops of corn, written by M. De L'Harpe, estimates the clear profit of one acre at one pound seventeen shillings. Therefore, as his method seems a very good one (though it is certainly the highest calculation of any I ever met with) I shall compare the clear profit, to be expected in the drill culture, with his calculation.

Mon

	£.	s.	d.
Mon. De L'Harpe reckons the annual produce of sixty acres to be worth -	170	0	0
From which he deducts for expences ten shillings per acre, and rent ten shillings per acre - - -	60	0	0
Clear annual profit on sixty acres -	110	0	9
Drill culture, three quarters, six bushels, two pecks of barley, at eighteen shillings, on one acre, consequently sixty acres are worth - - -	205	17	6
Deduct for rent, forty-five pounds, and for expences the same -	90	0	0
Clear annual profit out of sixty acres -	115	17	6

Hence it appears, that sixty acres in the drill culture is more advantageous than the highest calculation of profit, made by modern improvers. But this is not all. For the above is calculated from a horse-hoed crop of barley; whereas, in many soils, I am convinced, it is more profitable to cultivate wheat in that manner. I have had seven successive crops from the same land, without manure; and the soil is yet unimpovertished; and sown at present with wheat, the eighth crop.

	£.	s.	d.
I have had sometimes two quarters of wheat on an acre worth - - -	3	12	0
Whereas I estimate the crop of barley at no more than - - -	3	8	7½
But the clear profit from one acre of drilled wheat may be - - -	2	0	0

Thus have I, with candour, endeavoured to give a clear and comparative view of the old and new husbandry. During the eight years, that I have practised the latter, I have been careful to observe the peculiar advantages, and defects of each method: and if, upon the whole, I at last declare in favour of Mr. Tull's system,

system, it is without prejudice ; and merely from conviction.

That the old method, with the assistance of the more modern improvements by turneps, and clover ; and, by the alternate use of the leguminous plants, which require hand-hoeing, is very advantageous, I allow. Perhaps the farmer, who pursues this method in its greatest perfection, judges wisely in preferring a system, he is master of, and can confide in, to another, whose principles may be just, but the practice of which is totally different from his own. But the farmer, who is ignorant of these modern improvements, surely ought not to hesitate to adopt the drill culture ; which, a few years practice would render habitual ; and which, he would find to be much more beneficial. For it is certain, that this is less expensive than the old method ; and, when once adopted, easier in the execution.

SIR,

Ganton, near Malton, Yorkshire,
January 24, 1767.

AGREEABLY to my promise, I now send you the sequel of my experiments in agriculture. Nor should I have so long deferred doing it, had not indispensable business prevented me, not only by taking up my time, but engaging my attention to objects of a very different nature from the subject of this letter.

At the time, I sent you my experiments of the year 1765, I understood, that the *Museum Rusticum* was published under the patronage of the Society for the Encouragement of Arts, Manufactures, and Commerce ; and, therefore, desired my experiments might be inserted in that work, rather than published in any of the news-papers : But since I am informed, that the editors of that work (though perhaps most of them may be private members of it) do not publish any thing by direction of the Society as a body, I no longer adhere to my first intention ; but acquiescing intirely in their views, and truly sensible of the honour the Society has done me, in sending me their gold medal, I leave it to them to make whatever use of my papers they may think fit : and, if they judge it more for the interest of Agriculture, that the author's name should be published, I shall no longer desire to conceal mine.

S

My

My former experiments began in 1763; and ended in 1765: and they were confined to the culture of barley. But I think, it will set the advantages of the horse-hoeing, or Tullian husbandry, in a clearer light, if I give you the produce of the same field, cultivated during eight successive years (including the three I before gave you an account of) according to the principles of the new husbandry, without dung, or any other amelioration, but what the plow alone has obtained. In communicating to you my first attempts, I am sensible, that my inexperience will appear to be the cause of much loss. Nevertheless, my errors may serve as lessons to others: and, in calculating the profit of a certain portion of land, at a medium of eight years, as I include the first, and least profitable ones, I shall be scarcely suspected of any prejudice in favour of the horse-hoeing system.

About nine years ago, I was induced to begin experiments, by an accidental perusal of Mr. Tull's book of horse-hoeing husbandry. The promise of such immense advantages, accruing from a particular mode of tillage, seemingly neither difficult nor expensive, made by an author of established reputation, demanded at least a candid trial. If the author's principles were true, why not adopt them? On the contrary, if false, it was high time to undeceive ourselves, and others.

Though my first experiments did not answer, in that degree, which I had flattered myself they would, they, however, encouraged me to proceed: neither were the faults I committed, nor my ill success, unedifying: since I had the good fortune to correct the former; and gain experience from the latter.

Having now practised the drill culture constantly during nine years, as well as the horse-hoeing part, as that branch of it which consists merely in sowing corn, &c. in equally distant rows; having applied these methods of culture, not only to corn, but to most of the leguminous plants; and having extended my experiments very considerably; I may venture at last to recommend zealously a practice, I have always found both entertaining and profitable.

It is true, many writers on this subject have given a much more flattering account of drilling than I am able to give. If their accounts be not exaggerated, either
they

they have been more fortunate than I, in cultivating a soil more peculiarly adapted to horse-hoeing; or they have conducted their experiments with superior skill. However, I have never been able, from a single crop, in any one year, of any kind of vegetable, to obtain a larger produce from the same extent of equally good ground, where the land was laid out in beds, drilled and horse-hoed, than where the corn was sown at random. Vegetables of the pulse kind are the most improved by the horse-hoe: possibly as great a crop of pease, beans, or turneps, may be obtained by it. But wheat, barley, or oats, have usually yielded me a third more from random sowing; that is, if three quarters of wheat may be produced from one acre in the common husbandry, the same ground will, *ceteris paribus* produce no more than two quarters when drilled and horse-hoed. But the superiority of one method over another is not to be determined by its advantage of a particular crop; but by many successive ones; deducting the expences, and considering the net profits. This I have done: and the result is, that I cannot avoid giving the preference to the drill system.

The actual produce of a field of seven acres horse-hoed, without dung, during eight successive years.

D R I L L H U S B A N D R Y.

Years	Acres.	Corn sown.	Corn reaped.	Medium price of corn ea h year per bushel.	Value of the crop.
		quar. b. p.	quar. b. p.		l. s. d.
1759	2	Oats 0 1 2	Oats 8 6 0	at 1s. 6d.	5 5 0
	5	Barley 0 4 0	Barley 10 2 0	at 2s.	8 4 0
1760	4	Wheat 0 1 3	Wheat 4 5 0	at 3s. 9d.	6 18 9
	3	Barley 0 2 1	Barley 10 2 2	at 1s. 6d.	8 5 0
1761	4	Wheat 0 2 0	Wheat 5 3 0	at 3s. 9d.	8 1 3
	3	Barley 0 1 2	Barley 12 0 0	at 2s.	9 12 0
1762	4	Turneps 1 lb.	Turneps 60 tun		7 0 0
	3	Barley 0 1 2	Barley 7 2 0	at 3s.	8 14 0
		N. B. Turneps were sown in the intervals of the barley worth			3 10 0
1763	7	Barley 0 4 2	Barley 22 0 0	at 3s.	24 4 0
1764	7	Wheat 0 5 2	Wheat 12 4 2	at 6s. 3d.	31 8 1h
1765	7	Wheat 0 6 2	Wheat 10 0 0	at 5s. 6d.	22 0 0
1766	7	Wheat 0 5 3	Wheat 6 5 0	at 7s.	18 11 0
	56	4 4 1	109 6 0		161 11 1h
Deduct for the value of the seed					7 14 4
Remains net produce of seven acres in eight years					153 16 9h

COMMON HUSBANDRY.

Years	Acres.	Corn sown.	Corn reaped.	Medium price of corn each year per bushel.	Value of the crop.
		quar. b. p.	quar. b. p.		l. s. d.
1	7	Turneps 10lb	Turneps 140 tons		14 0 0
2	7	Barley 2 5 0	Barley 28 0 0	at 2s.	22 8 0
3	7	Clover 0 0 1	Clover 11 load	worth	10 10 0
4	7	Oats 3 1 0	Oats 35 0 0	at 1s. 5d.	19 5 0
5	7	Turneps 10lb	Turneps 140 tons	worth	14 0 0
6	7	Barley 2 5 0	Barley 28 0 0	at 3s.	33 12 0
7	7	Clover 0 0 1	Clover 11 load	worth	10 10 0
8	7	Oats 3 1 0	Oats 35 0 0	at 1s. 8d.	23 6 8
56		11 4 2	126 0 0		147 11 8

Deduct for the value of the seed 9l. 10s. 7d, and 210 load
of dung at 2s. per load 21l.

30 10 7

Remains net produce of seven acres in eight years

117 1 1

Drill husbandry, total produce of seven acres in eight years

153 16 9h

Common husbandry, total produce of seven acres in eight years

117 1 1

Consequently the drill is more advantageous by

36 15 8h
Proof 153 16 9h

N. B. It is presumed, that the plowing expences are nearly equal in each method: and, therefore, there is nothing charged here on that account on either side. The value of the seed, and crop, is set down to each, according to the medium prices of corn each year. The above seven acres of experiment have not been selected, as being particularly successful. But only as it happened to be the field where they were begun, and continued to this time, I was, thereby, enabled to relate the series of several years success. The soil is light, deep, and dry; a hazel mould excellent for barley, but generally thought not of sufficient tenacity for wheat; and worth, in this neighbourhood, fifteen shillings per acre, tithe free. The beds extend east and west: and the field lies gently sloping to the north.

This field has never been manured, as I observed before, since my experiments were begun; nor for many years preceding. It may be remarked, that the first
crops

crops were not the best; but, on the contrary, a regular improvement for some years kept pace with its cultivation: and the value of the four last crops is almost double to the former ones. The greatest fault committed at first, was the sowing too little seed. The land seems yet in perfect heart: and though the product of last year was less than its former ones, it was well known, that the wheat crop failed all over England: as is evident by the present high price of that grain. For I cannot allow, that the dearth of corn is owing to the bounty, as some pretend: having ever considered that act of parliament, as the Magna Charta of English agriculture; and tending, on the whole, to make grain more plentiful and cheap.

Besides the general causes of a scanty crop in my field of experiments last year, there were some particular ones, occasioned by my absence in the spring, and great part of the summer: whereby the hand-hoeing, a very material operation, was neglected; and the horse-hoeings not regularly or duly performed. I perceived, on my first examining the ridges in June last, that the partitions were full of weeds; and the intervals hard and compact. But it was then too late to apply an effectual remedy: though the weeding and horse-hoeing were even now of manifest service. The bad condition of the beds made me determine, not to sow wheat again for the next crop; but to give the land a thorough plowing in winter: and I prepared it to be sown in spring. The aforementioned field is valued at fifteen shillings an acre,

	f.	s.	d.
Consequently, the rent of seven acres, in } eight years, is - - - - - }	42	0	0
Plowing expences are, at most, fifteen } shillings per acre. I allow - - - }	42	0	0
For the rent and tillage of seven acres } in eight years, Total }	84	0	0
The total produce of seven acres in eight } years being valued at - - - }	53	16	9
If we deduct for rent and expences of tillage	84	0	0
There remains clear profit, from seven } acres in eight years - - - }	69	16	9½
S 3	Which		

Which is one pound five shillings clear annual profit from one acre. And though this profit be not near so considerable, as I before computed, from an actual crop of barley, where the land was in fine order, and every operation of hand, and horse-hoeing exactly performed; yet I judge it to be superior to the old method; and sufficient to demonstrate the advantages of pulverization.

	<i>£.</i>	<i>s.</i>	<i>d.</i>
The total produce of seven acres in eight years, in the old method is	117	1	1
Deduct for rent and expences, the same as above	84	0	0
There remains clear profit on seven acres in eight years	33	1	1

Which is not quite twelve shillings clear annual profit from one acre. Though this clear profit be much less than I calculated before: yet I apprehend, that there are many farmers hereabouts, who do not clear more. And, if some good managers do clear twenty shillings an acre, which I hope, and believe to be the case, I have shewn in my first calculation, that the improved drill culture is almost doubly beneficial; and, by my last calculation of a farmer's profit, who is not at the top of his profession, compared with the actual produce in a course of drilling, where numberless faults were committed, during the five years, the comparative advantage is as much on the side of drilling, as where I reckoned the produce of each method at a higher rate: and the proportionable excellence still remains annexed to the system of Tull.

As I have been ever careful to observe the difference betwixt crops sown at random, and those that were horse-hoed, I have frequently counted the number of grains contained in an ear of corn. Examples of which, I here set down.

Horse-

Horse-hoed ears of wheat, Common ears of wheat, taken at random, in 1764. taken at random, from a rich field, in 1764.

1st. Ear contained 57 grains	1st. Ear contained 48 grains
2. Ear — 59	2. Ear — 54
3. Ear — 63	3. Ear — 57
4. Ear — 58	4. Ear — 52
5. Ear — 57	5. Ear — 50
6. Ear — 53	6. Ear — 55
347	361

In each ear at
a medium } 57

In each ear at
a medium } $52\frac{1}{2}$

In August 1765, twenty-eight ears of horse-hoed wheat contained 1692 grains ; which is about sixty at a medium to each ear. Twenty-three ears of wheat, chosen at the same time out of an excellent broad-cast-field, contained nine hundred eighty-seven grains : which is forty-three at a medium. Two hundred and sixteen of these corns weighed two drams, two scruples, nineteen grains. One remarkable ear of horse-hoed wheat weighed one dram, and twenty-two grains. In the same year, sixty-five corns of horse-hoed wheat weighed a dram ; and in the common method seventy-five. Also several ears of horse-hoed barley contained from thirty to thirty-eight grains : of the common sort, from twenty-five to thirty-two.

August 29, 1766, twenty-three ears of horse-hoed wheat plucked at random contained one thousand seventy-two grains, or about forty-seven at a medium in each. The broad-cast sort contained about forty at a medium.

January 9, 1765, a piece of drilled turnep ground containing fifteen square yards, produced thirteen stone, four pounds and a half of turneps : which is at the rate of twenty-seven ton to an acre ; and the same of the best broad-cast turneps, contained in a space of ten yards square, weighed one hundred and six stone ; which is at the rate of thirty-two ton to an acre.

Nov. 28, 1766, twenty yards in length, of a turnep ridge, five feet broad, and horse-hoed, weighed thirty one stone. Consequently, the produce of an acre would

betwenty-seven ton. At the same time, a piece of common turnep ground, twenty yards long, and five feet broad, containing near thirty-seven square yards, produced twenty-seven stone. Consequently, the produce of an acre is near twenty-six ton. But the horse-hoed turneps were as big again as the others. I have produced these instances (and many more I might have brought) to shew, that pulverization, without manure, will bring corn, and other vegetables, to greater perfection than dung without hoeing. That the undunged root is sweeter, will hardly be contested : and that horse-hoeing is cheaper than manure, I think I have proved.

The horse-hoeing tillage applied to the roots of plants may be so critically timed, as to come at that precise period, when they stand most in need of it. If the beauty or external appearance of plants be of any consequence, those which are horse-hoed, greatly excel in this particular. Indeed, where two fields lie contiguous, the one horse-hoed, the other not, the difference is very striking. The productions of the one being healthy, vigorous, and of the finest verdure : whilst those of the other are pale, and sickly. A horse-hoed field has the appearance of a garden ; and enjoys a garden culture. The repeated stirrings not only improve the soil, by keeping it in a loose state, proper to be penetrated by the roots, and fibres of plants, which are thus easily enabled to draw their nourishment from it : but they expose every particle in its turn to the influence of the atmosphere ; and procure an inexhaustible supply of food for the purposes of vegetation.

I am, Sir,
Your most Obedient and
Humble Servant,
DIGBY LEGARD.

ADDITION to the EXPERIMENTS and OBSERVATIONS contained in the LETTERS written in 1763, 1765, and 1767.

SIR, Ganton, May 12. 1768.
AS I am unwilling to disguise any circumstance, that may appear favourable to the common, or to the disadvantage of the drill husbandry ; I cannot avoid informing

ing you that the produce of that particular field of experiment, containing seven acres ; and of which I related the crops of eight successive years ; was last year very defective. I drilled six acres with lentils, in the spring of the year 1767 ; and planted one with potatoes. These crops were chosen on account of a property, they are allowed to possess, of improving and mellowing the soil ; and preparing it for wheat crops : and in order that the weeds and twitch-grass, which some neglect last year had caused to abound, might by hand, and horse-hoeing, be effectually destroyed. The season proved so extremely unfavourable, during the ripening of the lentil crop (which before looked very promising) and the rains continued so violently after it was reaped, that the stalks and pods became quite mouldy ; and most of the grains sprouted. In this condition, it was obliged to be housed : and, therefore, it is no wonder it was of so little value. Indeed though the quantity was tolerable, the quality of the crop was so bad, that I cannot set any value on it ; but must esteem the expence of seed, and cultivation, as so much entire loss. Yet one of the ends proposed was effectually obtained, viz. the getting the land into fine order, for a succeeding crop of wheat : which was drilled last autumn ; and now looks perfectly well. The acre of potatoes succeeded better. A single row was planted on five feet ridges, fifteen inches distant in the rows. The produce was fifty-four bushels, which at six-pence per peck (the price at that time) were worth five pounds eight shillings : and that being the whole of the product of the seven acres, may be thus estimated, viz.

	£.	s.	d.	£.	s.	d.
Expence of rent, ———	5	5	0	}	9	16
Cultivation, ———	3	10	0			
Seed, ———	4	1	0			
Value of the crop, ———	—	—	—	5	8	0
Total loss ———	—	—	—	4	8	0

Therefore, as I reckoned, in my former letter, the total clear produce of seven acres, in eight years, deducting rent, and tillage } 69 17 0

I shall

I shall now include the last year's loss: and
 then the clear profit of seven acres in nine
 years, will be only

Clear profit of seven acres in nine years, in
 the common method

Difference ——— 28 4 0

I have added the medium profit of twelve shillings per acre, to the ninth year in the common husbandry; and have deducted the loss of four pounds eight shillings from the ninth year in the drill husbandry. Yet it is proved, that the latter gives an advantage of more than twenty-eight pounds over the former, in a lease of seven acres for nine years: and it is very probable, that when the present wheat crop now growing, and in a flourishing condition, shall be added to the account, the excellence of the horse-hoeing husbandry will be more evident. That part of this field where the potatoes grew, makes the best appearance at present: and therefore, I can particularly recommend this plant, as excellent preparative for wheat, whenever the cultivator shall think it necessary to vary his crops, in the drill culture. I have frequently found such variation proper. For even supposing the land capable of bringing wheat for many successive years; yet if it be over-run with weeds; or not brought to that perfect state of pulverization, which is essential to this system; a crop of pulse, which does not impoverish the ground, being sown in the spring, gives time to break the soil by two or three winter-plowings: and by its shade, and the frequent hand-hoeings it requires, enables one to obtain almost a complete victory over those arch enemies the weeds.

Of other exclusive benefits, attending the potatoe culture, I can give the following instance. October 31st, 1765, an acre of potatoes planted on a rich dry soil produced thirty-six quarters: which, at three-pence per peck (a very low price) were worth fourteen pounds, eight shillings. Another acre, the preceding year, was planted with potatoes on five feet ridges; viz. a single row on every ridge; and each planted a foot distant. These were well weeded, and horse-hoed: and the crop was thirty-seven quarters, five bushels: which, at three shillings per peck, comes to fifteen pounds, four shillings.

shillings. But here the land was very rich. Though
 can there well be a more profitable culture? Turneps
 are particularly suited to the Tullian system. But, if
 introduced, as an intermediate crop, should be sown ear-
 ly: viz. in the beginning of June, that they may attain
 their full growth, and be removed or fed off in time to
 give the ground preparation for wheat. I generally
 drill a single row of turneps on five feet ridges: and the
 produce is from fifteen to thirty-two ton, according to
 the goodness of the soil, and season. I think twenty ton
 may be reckoned the mean produce on land worth fif-
 teen shillings an acre. Some admirers of the Tullian
 scheme recommend all vegetables as proper for horse-
 hoeing; and particularly sainfoin: but I cannot think
 any of the grasses, excepting lucerne, can be so cultiva-
 ted to advantage. 'Tis true, I have had very great
 crops of sainfoin seed this way: and once, in particular,
 I measured the quantity, of a single row, on a three
 feet ridge; and found, that one hundred yards in length
 produced five pecks; and, consequently, that an acre
 would yield seven quarters, four bushels: an astonishing
 quantity! But it must be observed, that here the rows
 were perfectly weeded and the seed gathered by hand:
 so that scarce a grain was lost. Whereas in the com-
 mon way of mowing and threshing, there is generally
 immense waste: probably amounting to half the quan-
 tity. But, on the other hand, the expence of gathering
 the seed of one acre by women, calculated from the
 small row above mentioned, would amount to three
 pounds. Horse-hoed sainfoin is certainly most vigorous;
 and produces the finest seed. But because most vigo-
 rous, it does not follow that it makes the best fodder.
 On the contrary, many farmers are of opinion, that the
 stalks, where thus strong, and pipy, are improper
 food for cattle: and that the sainfoin, which is sown
 very thick, and is fine, is the best. But I own, I have
 seldom found, that horses leave any, not even the gros-
 sest parts of the sainfoin plant. They will eat the stalk,
 where the seed has ripened. Sheep are most delicate.
 For though they are excessive fond of sainfoin, both in
 grass, and hay, you may frequently see the thickest of
 the stems left untouched, where they have been fodder-
 ed. Though I do not altogether approve of drilling
 sainfoin, to be horse-hoed, I prefer the drilling of it in
 equally

equally distant rows, to sowing by hand. Because the drill sows more regularly than the hand; and you save half the quantity of the seed. I am sure, I have not less than one hundred acres of drilled sainfoin. Some of it in rows at one foot; and the rest at half a foot distance. The greatest quantity, I ever sow, is three bushels to an acre. The least (and which I generally sow) is one bushel and a half to an acre: and I have many fields, where the plants are quite regular; and stand as thick as one would wish: producing very good crops.

Now I am upon the subject of grass-seeds, I must remark to you, that I have, within these few years, inclosed an extensive tract of country, viz. near three hundred acres of the Wolds of Yorkshire: which is a wild heath; and almost barren down. I say almost barren: because, except near the villages, and in some more populous, and better cultivated parts, that immense country, called Wolds, is either a sheep pasture, or appropriated to the culture of miserable oats or barley. The tillage land, at a distance from the villages, has no other manure allowed it than what the sheep-fold affords. It has generally a crop once in two years: which, at a medium, cannot be said to produce more than three fold. They sow about four bushels of oats; and reap about twelve bushels. The soil is generally dry, shallow, and stony: and the tithe of the corn is usually of more value than the rent of the land. I speak of the highest, and worst parts of the Wolds. For in some of the vales, the land is rich. But I have several thousand acres, that do not lett for a shilling each acre. This inclosure, after being reduced into fine tilth by repeated plowings, and manured by the fold of a large flock of sheep, which I keep for that purpose, has been gradually and successively laid down with all the various kinds of grass-seeds, in common use.

The principal of those are sainfoin, all the clovers, burnet, trefoil, lucerne, rye-grass, rib-grass, and common hay-seeds.

Of all these, sainfoin has made the most general, and greatest improvement. This plant, whilst growing, is grateful to all kinds of cattle: and the hay is excellent. The produce from such land, as I have described, is, in a good year, about a ton to an acre: taking the whole crop of a large field together. It is true, I have
had

had three ton to an acre in rich land. But one ton from such poor land appears to me a more extraordinary produce : and besides, the hay is finer, sweeter, and more nourishing from the latter, than from the former.

As to lucerne, I could never get it to succeed on such a soil. I sowed a few acres, where the land was in perfect tilth, and free from weeds; had been well manured with the sheepfold, and with pigeons dung; and, after the first year, was well harrowed, according to the late Mr. Rocque's directions; but still the plants looked half-starved: and though there was a sufficient number of them, the crop was scarce worth mowing.

The burnet hath succeeded very well. I have sown, within these three years, about twenty acres with it; and have had good crops: which shews, it will do on a poor soil. But then I must confess, that my sheep will scarce touch it at first; and never seem to like it so well as other grasses. Some horses dislike it: but my cows in general are very fond of it. I once kept a cow above a week in a stable; and fed her with nothing but burnet: and we found both her milk and butter excellent.

The common broad clover has succeeded pretty well with me. Though, as it lasts but a year or two, it is fitter, for an intermediate crop, on tillage land, than to be sown where the land is to remain in grass.

The same objection lies against trefoil, and rye-grass. There is, indeed, a perennial sort of red clover; and, also, of trefoil; that grow commonly enough in many of our best meadows: which would be extremely well worth cultivating. But I have never been able to procure the seeds of these in any quantity. However, I intend to have both sorts gathered by hand; as likewise some seeds of the wild purple and yellow vetch. All which are excellent plants.

The white clover does very well in our upland pasture; and is particularly proper for sheep. It is often called honey-suckle, from its smell resembling honey; and its being a remarkable sweet food. I suspect, that the seeds of this plant will lye for many years uncorrupted in the earth. For I cannot, otherwise, account for the following fact: viz. I have frequently seen fields covered with this plant, where pasture has succeeded arable land, without any
body

body's remembering the sowing it : * and often, in an old worn-out meadow, or pasture, a crop of this will appear after plentiful dunging. Nor is this property of vegetating, after being so many years buried, peculiar to white clover. Mustard will do the same ; and the seeds of numberless weeds : as I have to my cost experienced. For in my field of experiment, where the horse-hoeing culture has been continued, during nine successive years ? where I have been particularly desirous to exterminate the whole race of weeds, by hand-hoeing, and the plow ; and where no manure has ever come, and consequently no accession of weeds ; yet even there I can scarcely perceive any diminution of the enemies strength. Like the heads of Hydra, one race succeeds another.

As I before might seem to cast some reflections on lucerne, I must now do justice to its merit. For I have cultivated it with success in a rich, deep, and dry soil. I have about two acres on beds of three and four feet breadth, in single, and double rows ; part transplanted ; and part sown ; which I keep carefully weeded : and which yields me generally three, and sometimes four crops in a summer. The first crop is now, the 13th of May,

* This fact of the white clover springing in great quantities on land copiously manured, where there was, before, such manuring, no appearance of it, is very curious : but frequent in the northern parts of England ; and in Scotland. It is not confined to manuring with dung : but the same event follows, where a change of soil is made, by lime, or marl, laid on in great quantities. I have an account by me of an uncommon large crop, not less than three tons an acre, being produced at Kedgely-moor in Northumberland, in consequence of a large quantity of lime being laid on some acres of black moor land, covered with heath. The heath was intirely killed : and this great burthen of white clover succeeded without any assignable means of conveyance of the seed. I find, from other accounts, that the same commonly happens in the county of Galloway ; where great quantities of such moor land have been lately brought into cultivation. Very copious manuring with lime, dung, or marl, appears there to destroy the heath and produce white clover.

May, ready to cut, being a foot and a half high. I find it of immense use ; and a very great saving of corn. I give it to my coach, and saddle horses, regularly every day, fresh as it is cut : and I really think it, in some measure, supplies the place of oats (1). I have frequently fed some of my horses with half lucerne, and half their usual allowance of corn ; and found, that those horses were in higher flesh, and spirits, than the others ; which had their usual food : viz. hay and corn. I think the transplanted lucerne is somewhat more vigorous than what was sown on the beds, with the single rows at three feet, or with the double at four feet distance. But the difference is not very great. Upon the whole, I prefer transplanted single rows, on beds three feet broad ; and the plants one foot distant in the rows. In this method, they are easily hand-hoed : and a plow may work conveniently in the intervals. But either in single, or double rows, with three or four feet interval, transplanted, or sown, it may do extremely well ; provided you weed carefully : but that is essential. With such care, and expence, often repeated, viz. three times a year, you may have good lucerne on almost any soil ; and, without it, the most proper soil in the world will not support lucerne above a year or two. I have followed Mr. Rocque's instructions in sowing lucerne broad-cast on a good soil ; and harrowing : but never could obtain a valuable crop after the first year. As to the quality of lucerne,

(1) The remark of lucerne's supplying the place of corn, in the feeding of horses, is verified by a fact related in a letter to Dr. Templeman, from a gentleman of undoubted veracity, inserted in a collection published in 1766 : where the writer says, " In 1763, the plant
 " were arrived at a size to yield so full a crop, as to
 " maintain five horses from the middle of May to the
 " end of autumn ; or about five months. These horses,
 " though constantly worked very hard, had neither
 " corn nor hay given them during all this time : and
 " yet they remained in health and spirits, and grew fat.
 " A horse, which in May, was in so bad a state of
 " health, that it was thought he could not live, soon
 " recovered when fed with lucerne."

lucerne, I have the highest opinion of it. It is wholesome, nourishing and heartening; particularly good for bringing lean cattle, or horses quickly into flesh. All beasts are remarkably fond of it: and the quantity of it produced is very great; particularly if we may credit what M. Duhamel relates of six ton of hay being the annual produce of an acre: but, whatever advantages may accrue from the climate of France, we are not to expect such crops in England, at least not in a general way. But I do not hold it to be impossible, even with us. However I imagine some other grasses may produce more than lucerne: particularly the common broad clover: which, on twice mowing, I believe will yield a greater burden than lucerne at four cuttings.

I forgot to mention a circumstance, in regard to burnet, in its proper place, which is this: It has been much disputed whether or no there be two distinct species of the burnet grass; or whether that sort, which Mr. Rocque brought into fashion, differs from the common wild burnet, so frequent on many heaths and pastures. As the latter abounds in my neighbourhood, I had an opportunity of making the experiment, which follows. I ordered my gardener to collect a number of the wild burnet plants, from an upland pasture; and plant them in my garden; and to sow another contiguous bed with the seed I had obtained from Walham-Green. He did accordingly: and I have observed, that a garden culture makes little or no difference in the nature of the wild plant. It bears the general resemblance it originally had to the cultivated burnet: but maintains its peculiar difference. The wild sort is of a much darker green: and the leaves are smaller, and less indented. The cultivated kind is, upon the whole, a much larger plant. The stalks are more red: and its taste more agreeable to cattle. I have given an handful of the one to my cows; which fed voraciously on it: and, on presenting the other, they rejected it. My horses in general, eat the burnet grass very well. Yet some do not take kindly to it at first; and others will not take to it at all: which observation, as it has been frequently made by others, shews there is something particular in the nature of this plant, which is not agreeable

able to every constitution. Horses will eat burnet seed : and it might possibly prove a substitute for oats. *

the

* The produce of burnet seed is exceedingly great : and if it should be found to agree with beasts, would certainly afford a very profitable return. Mr. Lambe, who gained the Society's premium for cultivating burnet, mentions, in a letter on this subject, that in the dry summer 1765, though by the mismanagement of keeping cattle on the field of burnet, from the middle of April to the 20th of May, he greatly injured the crop of seed; yet obtained two hundred bushels from seven acres and a quarter from one reaping : and he intimates, he might have had another crop, if he had not been indifferent to it, from having already got as much seed as he knew how to dispose of. According to this, and other accounts, it might be practicable, from two complete crops in one year, to produce ten quarters from an acre. How far the nutritious quality of burnet seed is equal to corn, is not yet well determined. It has been said to be equal to oats ; but the lightness and chaffy texture of it give room to suspect otherwise. There is however the greatest reason, from the gentleness of the flavour and smell, to believe it would be a wholesome food : though, from the slight pungency in the taste, it must be concluded of a warm quality.

If it should agree with horses and cattle, certainly it would be a much more profitable article than oats in the light of provender ; allowing it to be less nutritive ; considering that a field of burnet will hold a number of years ; is not originally expensive in the cultivation ; and besides, the seed would afford a great additional advantage in hay and pasture, at the time when most wanted. Mr. Lambe had seven sacks of chaff, and seven loads of hay, along with the two hundred bushels of seed from the seven acres and an quarter. And, after this crop, which was in the beginning of July, he turned into the burnet seven cows, two calves, and two horses : which it supported till Michaelmas. The cows, notwithstanding the great drought, gave an uncommon quantity of rich milk. This, together with the feeding six head of cattle on it again in November ; and eating it the five

T

weeks

As I have in a former letter, mentioned the price of horse-hoeing, and of the drilling instruments, in my neighbourhood, I shall here give the prices of the common instruments; and of day-labour.

	<i>l.</i>	<i>s.</i>	<i>d.</i>
A common foot-plow compleat costs about -	0	11	0
A waggon —————	20	0	0
A day labourer in winter and in spring —	0	0	10
Ditto in hay-time —————	0	1	0
During harvest —————	0	1	6
A carpenter or wheelwright per day —	0	1	4
A mason per day —————	0	1	8
Mowing grass, if a middling crop, costs per acre	0	1	0
The same for barley or oats —————	0	1	0
Plowing an acre of light land with two horses	0	3	6
Of such land they generally plow an acre in a day.			
A load of dung —————	0	1	0
Ditching in soft earth for a solid yard —	0	0	1
In harder ground —————	0	0	2
Or perhaps, according to its nature —	0	0	3
The women have a day for hay —————	0	0	5
And for harvest work. —————	0	0	8

Two quarters of wheat, and four of barley, are commonly obtained from the best fields. The rent of which is twelve shillings per acre.

The usual course of crops is turneps, barley, clover, wheat. They plow three or four times for a turnep crop; and hoe once: which costs six shillings an acre.

Twelve or fourteen loads of dung are used for the turneps: which, as the land hereabout is light, or sandy, are generally fed off with sheep folded thereon.

One

weeks beforementioned, in the spring; shews the culture of burnet to be extremely profitable, if the seed could be any way made a substitute for oats.

Mr. Lambe found his horses eat the seed very well, and imagines it will be as good as oats. But it there bore too great a price for other purposes, to be appropriated to that of feeding horses.

One plowing is given for the barley, before winter; and another in April, immediately before sowing.

About two and a half bushels of seed are sown on an acre.

The clover is generally mowed twice. But, in that case, and if wheat be to follow it, our farmers lay a few loads of manure, on the clover stubble; and plow it in: after which, the wheat is sown on one tilth.

It is time now to conclude this long letter. I have endeavoured to give you a fair and candid account of my success, improvements, and experiments in agriculture. If, amongst a variety of trials, some have succeeded, I may hope my success may encourage others to prosecute the same: and, where I have failed, my errors may teach them to avoid falling into the same.

I can, however, say with truth, that, after ten years constant, and very extensive practice; after the experience of a great variety of soils, and seasons; I can recommend the drill, and horse-hoeing culture, as founded on reason, and on truth. I have constantly attended, with all the impartiality I am master of, to the peculiar advantages, inconveniencies, expences, and benefits, both of the old and new husbandry: and I cannot avoid giving my verdict in favour of the latter.

I am, Sir,

Your most obedient,

And humble servant,

DIGBY LEGARD.

ARTICLE IV.

REMARKS *on the comparative profits of the DRILL, and BROAD-CAST TILLAGE, as deduced from the account * of experiments, made in Cumberland, by the Rev. Mr. LOWTHER; communicated to the SOCIETY FOR THE ENCOURAGEMENT OF ARTS, &c. in 1763; and those made by Sir DIGBY LEGARD in Yorkshire, related in the preceding article.*

THE very instructive lights afforded by the account of eight years experiments on the drill, and broad-cast manner of tillage; or, as they are commonly called, the old and new husbandry; given in the preceding article, cannot fail to be acceptable to those, who are solicitous for the advancement of agriculture, into whose hands it may fall. The consideration of the comparative advantages of these two methods of culture, furnishes more important matter of speculation than any other subject of this nature, which can possibly occur in the pursuit of the improvement of husbandry. Since it does not confine its views to the cultivation of one single plant only, but extends them to nearly all that are made the subject of tillage; except the several species of true grass: and even with respect to them, it has a convenience, already known by experience, when they are to be raised separately for seed.

Nothing, however, can be conclusively determined with respect to the absolute or comparative utility of any mode of tillage, but by observations on facts, occurring in trials made at large, and under such a variety of circumstances, as may prevent the deception into which accidental contingencies, and the peculiarities of soil, and season, are apt to lead. Every just and full report, therefore, of any experiments on drill culture, especially if performed concurrently with broad-cast, on the same land, must contribute to the collection of *data* wanted

* This account was sent to the Society in claim of the gold medal offered for the best sett of experiments to determine the comparative advantages of the drill and broad-cast tillage, in the cultivation of wheat; and obtained that premium.

wanted for the decision of the momentous questions : Which is the most profitable, of the drill and broad-cast methods of tillage?—and, Under what circumstances, as to soil, and mode of culture ; and with respect to what subject plants ; does the preference lie?—Speculations on sound principles will lead us to form rational conjectures, and to follow a right course in our experiments ; and in that respect are essentially conducive to improvements of this kind ; but they can never enable us to decide with certainty, till we have the evidence of actual trials.

There are, however, such accounts of experiments already made, which have been laid before the public, or the Society for the Encouragement of Arts, &c. as give the greatest room to believe, that, through the increase of produce in quantity, or value, or the diminution of expence, the profits of tillage, may, in a term of several years taken together, be rendered a third greater, or perhaps even doubled to the farmer, by the substitution of the drill culture in the place of the common, or broad-cast. This preference appears, from these experiments, also, in some degree, to hold good of indifferent, as well as rich soils ; and of other kinds of cultivated plants, as well as corn, and to have many other advantages. But among the accounts here alluded to, there are none, which supply more ample matter towards the determination of these points, than that abovementioned. As it contains a very minute detail of the circumstances, requisite to be known, both with regard to the culture, and produce, of a considerable portion of land for eight successive years, delivered in such a distinct, methodical, and impartial a manner as is rarely found in communications of this kind. The being authenticated by a very respectable name stamps, moreover, an additional value. For such accounts of experiments, when given on dubious authority, lose thence a part of their weight with the public. But the particular utility of the experiments in that account, consists in their being principally directed to decide, how far a new mode of tillage may supersede the use of manure : which, though there are many others, is the principal advantage proposed in the drill culture. Whereas most of the other experiments have been made on land pre-

pared with manure, and consequently have no tendency to elucidate this great point.

Whatever may conduce, nevertheless, to give a stronger sanction, on a just foundation, to those deductions, in favour of the drill-culture, which may be drawn from this account, might claim a place here : but there is one communication which has a particular right to it. In the same year, the first letter of the preceding article was received by the Society, another instructive account, of similar experiments on drilling, but with the use of manure, made in Cumberland by Mr. Lowther, was laid before them. This tends to corroborate, and support the conclusions afforded by the other ; and to add, also several collateral lights, that may render it more extensively useful. A brief view of them brought in comparison with each other, will illustrate several important particulars in both ; and render them more effectual to the proposed end of deciding on the merits of the two methods of culture.

The course of tillage with relation to the choice and succession of crops, as well as the kind of land, and preparation, were, however, different in the Cumberland account from the Yorkshire ; and the comparison was also made with a different set of crops in the broad-cast. In order, therefore, to form just practical deductions from this account, it is necessary to premise some particulars of the circumstances and manner of tillage in both ways, which were practised in these experiments. The broad-cast method was that, commonly followed in the cultivation of wheat in Cumberland, and many other places of England. The first year is a crop of turneps raised with a full proportion of manure : the second year is a lea, or absolute fallow : and the third year is a crop of wheat. The same rotation is practised every three years.

The manner of drill-tillage followed in these experiments, was, with respect to the course of three year crops as follows. The first year, turneps, with half the quantity of manure of the broad-cast : the second year, barley : and the third year, wheat. The barley and wheat are repeated the fourth and fifth year : and then the manuring and turneps must take place again.

The ridges were formed five feet and a half wide : and there were a treble row of drills, at seven inches asunder on each ridge.

The

The land, on which the experiments were made, was “a heavy moist soil, with a clayey bottom; and deemed too stiff for barley.” It was tilled out of lea; and had borne a crop of oats. The rent was eight shillings per acre.

Expences and produce of the BROAD-CAST TILLAGE
of one acre of land, as practised in CUMBERLAND.

The first year for turneps.

	£. s. d.
Three ploughings with two horses: the first in March, second in May, and third in June —————	} 0 10 6
60 one horse cart-loads of manure — — —	1 0 0
90 bushels (Winchester) of lime — — —	0 15 0
Six days work of man and horse loading the manure, and two ditto the lime ———	} 0 14 8
Two days work of the labourer spreading the manure —————	} 0 1 8
Seed, and sowing —————	0 2 0
Three harrowings —————	0 1 6
	3 5 4
Total expence the first year ———	

The Value of the crop of turneps produced may
be computed at ———— £. 3 0 0

The second year for fallow.

The third year for wheat.

Four ploughings ——— ——— ———	0 14 0
Four harrowings and sowing ——— ———	0 2 6
Seed wheat three bushels ——— ———	0 12 0
	1 8 6
Total expence the third year ———	

The value of the crop of wheat, being three
quarters, at 4s. per bushel ——— ——— 4 16 0
Total produce in three years ——— ——— 7 16 0

	£.	s.	d.
Brought over, Total produce in three years	7	16	0
Total expence for three years, including rent at 8s. per annum per acre	5	17	10
Total profit in three years	1	18	2
Annual profit on the three years taken together	0	12	8 $\frac{1}{3}$

Expences and produce of the DRILLING and HORSE-HOEING TILLAGE of one acre of Land, as practised by Mr. LOWTHER in CUMBERLAND.

The first year for turneps.

	£.	s.	d.
Three ploughings with two horses, viz. the first in March, second in May, third in June	0	10	6
30 one-horse cart-loads of manure	0	10	0
Forty-five bushels (Winchester) of lime	0	7	6
Three days work of a man and a horse loading the manure, and one ditto the lime	0	7	4
One day's work of a labourer spreading ditto	0	0	10
Seed	0	0	6
Harrowing and drilling	0	1	6
Three horse-hoings, each equal to one-third of an acre	0	3	6
Total expence the first year	2	1	8
The value of the crop of turneps produced may be computed at	2	10	0

The second year for barley.

Two ploughings, viz. the first in March, and the second in April or May	0	7	0
Seed barley, viz. one bushel (Winchester)	0	2	0
Harrowing and drilling	0	1	6
Three horse-hoings	0	5	0
Total expence the second year	0	15	6
The value of the crop of barley produced may be computed at	1	16	0
The			

The third year for wheat.

	£.	s.	d.
One ploughing before Michaelmas	—	0	3 6
Seed wheat	—	0	4 0
Harrowing and drilling	—	0	1 0
Five horse-hoeings	—	0	5 10

Total expence of the third year, 0 14 4

The value of the crop of wheat, being fifteen bushels, at 4s. per bushel — 3 0 0

The value of the crops of barley and wheat, in the fourth and fifth years, being added, the total produce in the five years will be 12 2 0

The tillage of the barley and wheat, in the fourth and fifth years, and the rent for the whole time at 8s. per acre being added, the total expence will be 0 17 4

Total profit in five years — 5 4 8

Annual profit on five years taken together 1 0 11 ⁸/₁₅

Annual difference of profit in favour of the drill culture — 0 8 2 ⁸/₁₅

It appears by this account, that, according to the method of drilling practised here, five successive crops may be obtained from land which lets for eight shillings per acre, in Cumberland, in five years: with half the quantity of manure which is requisite in the broad-cast tillage in three years, and consequently half the expence, also of carrying and spreading it. But the crop of turneps, compared with the broad-cast, in which the full quantity of manure was used, seems deficient in the proportion of two pounds ten shillings to three pounds. The crop of wheat, likewise, in the other year, seems deficient, in the proportion of one quarter seven bushels, to three quarters: or in other words, of fifteen bushels to twenty-four bushels, the produce of the broad-cast. The saving nevertheless in the expence of the cost, and labour of manuring, and of two bushels of seed wheat each year of that crop; together with the profit, of the crop of barley in the second and fourth year, instead of fallow every third year; exceed the loss from

from these deficiencies so much, as to afford a greater gain to the former of eight shillings and two pence half-penny each year : taking the five together. This is performed ; likewise with less expence and disbursement on the side of the drill tillage, in the proportion of twelve shillings each year ; taking a term of fifteen years together. The great advantage, in point of profit, of the drill tillage over the broad-cast is apparent on the face of this account : besides those other advantages, and conveniencies, which attend this mode of culture. There is no doubt, however, but that on further experiments, Mr. Lowther would have improved his method, so as to have rendered the profits greater : and particularly it must be observed, his crops of barley from the unsuitableness of the land are proportionably much inferior to his crops of wheat.

If we make a similar estimate of the produce, and expence of land cultivated constantly with wheat in the drill way, without any manure, according to the particulars in Sir Digby Legard's account, we shall see, that it still affords considerable profits : such as are much greater than can be obtained by the most improved broad-cast.

The greatest crop of wheat stated in this account, to be produced in the eight years, was twelve quarters from the seven acres, which was in the year 1764, after five other crops of wheat and barley, and one wheat immediately preceding. The least was six quarters the year after, in 1765 ; an extraordinary bad year. The soil, moreover, is not well suited to wheat, but more fit for barley : as is remarked in the account ; and as the proportion of the crops themselves evince. We may, however, reasonably admit, that, on this land, by the best of the methods he practised in the eight years, there may be obtained constant crops of wheat which, *communibus annis*, would yield one quarter, four bushels, of grain. This is to be understood to be without the use of any manure. For the shewing, that profitable crops may be so obtained by drilling, is the great point, to the elucidation of which, these experiments tend. The land, as we see in the account, " was light, deep, " and dry ; a hazel mould, excellent for barley, but generally thought not of sufficient tenacity for wheat ; " worth,

"worth, in that neighbourhood, fifteen shillings per acre."

Expence and produce of each year for drilling wheat, according to the method practised by Sir Digby Legard.

	£.	s.	d.
Two ploughings, — —	0	8	0
Seed, one bushel, — — —	0	4	0
Three horse-hoeings, — — —	0	3	0
One hand-hoeing, — — —	0	2	6
Rent of land, — — —	0	15	0
Total expences, — — —	1	12	6
Value of the crop, being 1 quarter, 4 bushels, } at four shilling per bushel, — — —	2	8	0
Annual profit, — — —	0	15	6

It appears hence, that a yearly profit of fifteen shillings and six-pence, *communibus annis*, might have been gained by drilling wheat on this land constantly every year: without any impoverishment of the land: though no manure or fallow were used. And as the annual profits of the same land would not have been more than twelve shillings, if cultivated with a succession of different crops in the common way of that country, there is a difference of two shillings and six-pence in favour of the drill. Further, if we compare it with the actual produce of seven acres cultivated in the broad-cast, for eight years, as stated in the particular account of the experiments, in the preceding article, we shall see it is, on the whole, six shillings and two-pence per acre, more than was really gained by the broad-cast.

These facts furnish very conclusive reasons for believing, that wheat can be cultivated constantly without manure, even on land not well suited to it, with greater profit than the common crops in the broad-cast, with the aid of fallow and manure. But this profit would necessarily be found to be much greater on land, that is properly suited to that grain.

If

If we take the same view of the actual produce, in these experiments, of the barley, cultivated in the drill way, for which this land was proper, the facts shew the real profits equal to those, we have deduced here, with respect to wheat, by conclusions.

We find the actual crops of barley in drill, produced at least three quarters per acre: which at eighteen shillings per quarter amounts to two pounds fourteen shillings in value. The expence in seed for the barley, is less by one shilling and four-pence half-penny than for the wheat: which reduces the expence of seed and tillage to fifteen shillings and seven pence half-penny, instead of the seventeen shillings and six-pence for wheat.

	£	s.	d.
The produce, therefore, being in value,	2	14	0
The total expence, including rent —	1	10	7½
The profit will be, —	1	3	4½

The profit in cultivating barley constantly on this ground in drill, without manure or fallow, is therefore greater than that of the common broad-cast course of crops and tillage, with full manure, by eleven shillings and four pence half-penny per acre: which leaves no reason to doubt, but that, on land equally fit for wheat, as this was for barley, the advantage over the broad-cast would be the same.

As Mr. Lowther's experiments, therefore, shew, that, without any fallow, and with half the manure commonly used in three years, applied only once in five years, on land of eight shillings an acre in Cumberland, he gained by drilling, eight shillings and two pence, annually, more than by the broad-cast; which affords about twelve shillings profit there: so Sir Digby Legard's experiments have demonstrated, that, on land of fifteen shillings in Yorkshire, about twelve shillings per acre, more than by the broad-cast which is there, likewise, about twelve shillings in acre, may be gained by the drill method.

The facts in these accounts, therefore, go far towards demonstrating, that improved tillage may be substituted for manure and lea fallow, with an increase of profit,
and

and a diminution of the farmer's disbursements and trouble. Since the ploughing, and other operations of tillage are, according to the best mode of drilling, rather less than greater, compared with those of the broad-cast; and the labour, as well as cost of the manuring, is saved: which, as well as the advance of the expence of the fallow rent, does not afford a full return the same year. It must not be understood, however, that where fallow and manure are omitted, even on very good land, constant crops of wheat or barley will be obtained by drill culture, equal to the best crops in broad-cast, with fallow and manure. The facts, in all the different accounts, which have been given, shew them to be about half, on the middling land, and two-thirds on the best. But the savings in expences of cultivation, manure, and rent of fallow land, with a constant succession of crops of wheat or barley, render the profits greater in the proportions we have given, on the whole account of expences and products, when estimated for a proper term of years.

The facts, and calculations in Mr. Wynne Baker's report to the Dublin Society, of his experiments on drilling wheat, and barley, carry this much farther. In the broad-cast, consisting of a succession of fallow, wheat, and oats, every third year he charges nine barrels of wheat per acre produce from each crop. The fallow year is lost: and the oat yields in value to the wheat, only as four to nine. In the drill way, he obtains six barrels of wheat every year in a constant succession. It is proper to observe, that this is on the plantation acre, which contains seven thousand eight hundred and forty square yards: and is consequently larger than ours by three thousand square yards. The total expence, including rent, *communibus annis*, in fifteen years, is two pounds ten shillings, in the broad-cast; and two pounds, five shillings, and one penny, in the drill culture; according to his state of them; which is four shillings and eleven-pence annually in favour of the latter. But the difference of the value of the produce, which is to be added to this saving, is so great, that it appears, as he says, according to his state, "a farmer, having forty
" acres of tillage, supposing him to direct his attention
" to bringing it to the drill culture, would make, in
" fifteen years, nine hundred sixty-nine pounds, ten
" shillings,

“ shillings, more than he can in the common husbandry :
 “ which is such an advantage, that the greater profit
 “ in the drilling acre will purchase the fee-simple of that
 “ in the common husbandry, at twenty-seven years
 “ purchase, valuing the land at eighteen shillings an
 “ acre. Thus it appears, that, in every fifteen years,
 “ the fee-simple of all the tillage lands in the kingdom
 “ is lost to the community, by the common course of
 “ tillage.”

A R T I C L E VII.

*Account * of Experiments, made to determine the comparative Advantages of the DRILL, and BROAD-CAST TILLAGE of Wheat ; communicated by Mr. Cox, to the Society for the Encouragement of Arts, Manufactures, and Commerce ; and inserted at their Request.*

To Robert Dossie, Esq;

S I R,

THE Society for the Encouragement of Arts, Manufactures, and Commerce, have directed me to deliver to you Mr. Cox's letters ; in order to their being published in the Memoirs of Agriculture, if you think proper.

By Order,

PETER TEMPLEMAN.

S I R,

BELOW is the draught of sixteen different experiments made on wheat, in the same field.

If the time limited for delivering in the accounts of the culture of wheat, in claim of the premium, had been

* This account was sent to the Society by Mr. Cox, in claim of the gold medal, offered, for the year 1767, for the best sett of experiments to determine the comparative advantages of the drill, and broad-cast culture of wheat ; which was adjudged to him.

been after Christmas, I could then have acquainted you with the difference in the measure. *

I am, Sir,

Your most Obedient

Humble Servant,

Wallhampton, near Lymington,

Nov. 12, 1767.

MATTHEW COX.

White wheat sown in broad-cast, Nov. 5; soaked in fresh water twelve hours; in brine twenty-four hours; and limed. Two bushels of seed to an acre. Produce 190 sheaves. } No. 1.
1 Acre $\frac{1}{2}$.
Narrow
Lands.

White wheat sown in drills, Nov. 6; soaked in fresh water twelve hours; in brine twenty-four hours; and limed. Two pecks of seed. Hoed by children the 2d of May, at a half-penny per row; which came to one shilling and four-pence. This was out of the ground two days before No. 1. Produce 151 sheaves. } No. 2.
1 Acre.
Narrow
Lands.

White wheat sown in broad-cast, Nov. 5; prepared as No. 1, and 2. One bushel and an half of seed per acre. Produce 140 sheaves. } No. 3.
2 Acres.
Narrow
Lands.

White wheat sown with a drill plough, Nov. 5, and 7; prepared as No. 1, &c. Seven pecks, one quart of seed on the two acres. Hoed by children the 4th of May, at a half-penny per row, which cost me one shilling per acre. Produce 396 sheaves. Most of the ears of this wheat and No. 2, at harvest, were six and seven inches long. } No. 4.
2 Acres
narrow
Lands.

White wheat sown in broad-cast, Nov. 23; brined three hours; and limed. Two bushels of seed. Produce 60 sheaves. } No. 5.
 $\frac{3}{4}$ Acre.
Narrow
Lands.

No.

* After this letter was written, part of the wheat was threshed, before its being sent; and the amount of the produce will be found below.

N^o. 6. Red wheat sown in broad-cast. Two
 3 Acres. { bushels and an half of seed on an acre. Brined
 Broad three Hours; and limed. Produce 490 sheaves.
 Lands. { Small ears, but very good wheat.

N^o. 7. White wheat sown in broad-cast, Nov. 15.
 1½ Acre. { Two bushels and an half of seed; which was
 Broad brined twelve hours; and limed. Produce
 Lands. { 380 sheaves.

N^o. 8. White wheat sown with the drill plough,
 1½ Acre. { Nov. 7. One bushel and an half of seed;
 Broad which was brined twelve hours; and limed.
 Lands. { My servant hoed this wheat the 20th of May.
 { Produce 370 sheaves.

N^o. 9. White wheat sown in broad-cast, Nov. 7.
 1½ Acre. { Two bushels of seed. Limed only. Produce
 Broad 240 sheaves.
 Lands. {

N^o. 10. White wheat sown with drill-plough.
 1½ Acre. { Nov. 7. One bushel and an half of seed. Li-
 Broad med only. Produce 150 sheaves.
 Lands. {

N^o. 11. White wheat sown in broad-cast, Nov. 7.
 ¾ Acre. { Brined twelve hours; but not limed. Two
 { bushels of seed. Produce 150 sheaves.

N^o. 12, 13, Carrots last Year.
 2 Acres. {
 1½ Acre. {
 Broad Lands. {
 { White wheat sown in broad-cast,
 { Nov. 7. Brined twelve hours; and limed
 { One peck and an half of seed. Produce
 { 70 sheaves.
 {
 { Red wheat sown with drill-plough,
 { March 11. One bushel and an half of
 { smutty seed. Brined forty-eight hours;
 { and limed. It was so very wet, I could not
 { cover the seed sufficiently. This wheat
 { I mowed; and gave to my hogs.

Red smutty wheat sown in broad-cast,
Nov. 20. Two bushels and an half of seed.
Brined a few minutes; and limed. Pro-
duce 324 sheaves.

1½
Acre.

Red smutty wheat sown with drill-
plough, Nov. 20. Three pecks of seed.
Brined five hours; and limed. This wheat
my servant hock, the 26th of May. Pro-
duce 156 sheaves.

¾
Acre.

Red smutty wheat sown Nov. 23. Three
bushels of seed. Neither brined, nor limed.
Produce 261 sheaves.

1½
Acre.

This crop was good wheat; except be-
ing a little smutty near the hedge.

N^o. 14,
Vetches last year.
15.
3½ Acres.
16.

N^o. 1, 2, 3, and 4, were chalked.—N^o. 5, was
dunged and chalked: and, on the 20th of January;
twelve bushels of foot were sown on it.—N^o. 6, 7, and
8, had, also, in January, foot sown on them, in the
proportion of eighteen bushels per acre.—N^o 9, and 10,
had no manure.—N^o. 11, was only chalked.—N^o. 12,
having had carrots cleared off at Michaelmas, had no
manure.—N^o. 13, bearing carrots, could not be clear-
ed off, nor the ground got into proper order, till Febru-
ary; the season being so very wet.—No. 14, 15, and
16, bore vetches in 1766.—They had no manure.
The ears of the wheat produced on this ground were
small; but the grains large. Near the hedge they
were smutty; but not half so bad as the seed.

The ground, on which these experiments were made,
is a shallow mould, on a gravel. The whole field is
nearly alike; excepting that, from N^o. 12 to 16, the
soil is a little lighter, and runs deeper.

The drilled wheat produced in general six, seven,
eight, and some twenty-five stems, from one grain.—
N^o. 2, was remarkable for the number of stems from
each grain: but the quantity of seed sown was too small.
I look upon one bushel of seed to be quite sufficient for

one acre. † The quantity commonly sown, in this county, is from two bushels, to two and a half, per acre. At the rate, which wheat is now sold, there is a saving in the drill-method of sowing, of near the rent of the land : viz. twelve shillings and six-pence per acre.

The number of sheaves produced by the drill-culture were not so many, in some of the experiments, as by the broad-cast : but they all weighed more ; and produced more grain. The ears, also, were considerably longer : which I attribute to the hoeing ; and the length of time the seed was steeped in brine.*

The field, in which these experiments were made, is called Wimble-field, situated on Wallhampton-hill, on the east side of Lymington river. It contains twenty-three acres within the fence.

The quantity of wheat produced per acre, cannot be ascertained : none of the red wheat being threshed ; and only about half the quantity of the white, that was obtained in the broad-cast method of culture. My real opinion, however, is, that the drilled wheat will yield the most grain.

Nov. 19.

N. B. Since I wrote the above, I have threshed a quantity of both the red and the white wheat ; and find, that twelve sheaves of the red wheat, cultivated in broad-cast, yield one bushel of grain : whereas from ten sheaves of the white wheat, cultivated in drills and broad-cast, the same quantity may be obtained. I have threshed five hundred sheaves of the produce of each of the

† This agrees with the other accounts of the drill-culture, that one bushel of wheat is sufficient, as seed, for one acre of land cultivated in that method. As two bushels is the quantity most proper in broad-cast, *ceteris paribus*, a saving would be thence made, equal to the rent of the land, taken at a medium value, when wheat is at the price here stated.

* The ears of corn, from the several divisions of the land, according to the numbers by which they are distinguished, that were sent to the Society, as specimens, along with the account of the experiments, appeared, on the examination made by the committee, to which they were referred, to verify what is here said of them.

the methods of culture. The sheaves were as equal in size as possible; and weighed about twenty pounds each. The ears I have sent to the Society were not picked; but the general size of each experiment.

S I R,

Wallhampton, May 2, 1768.

IN answer to yours,* the lands of the experiments N^o 1, 2, 3, 4, were chalked, about fifteen load per acre.—N^o 5 was manured with dung and chalk; about fifteen load per acre.—N^o 7 was only dressed with foot, sown by hand in the spring.—N^o 12 was chalked as the above. The lands to N^o 12 had all three ploughings; and were dragged.

The seed-wheat was harrowed in; except the lands sown with the drill-plough: which were harrowed before they were sown. We sowed about three acres per day with the drill-plough: which finished.—The other lands were before carrots and vetches; and had only one ploughing after the crops were off.

I put no more lime than would just cover the wheat sifted through our ash-sieve, after it was taken out of the sieeps. I think, three bushels of lime were all that were used for the seed of this field. The first ploughing, we charge six shillings per acre: the second, five: the third, four shillings.

I have sown some wheat with the drill-plough last Michaelmas; have now sixteen stems from many of the single grains; and think it has not done tillering.

The wheat, that was brined this year twenty-four hours, did not rise till the twenty-first day after sowing; and many farmers said, it would never come up. But that wheat now promises to be the best crop.

If I can give any further information, I shall do it with pleasure.

I have sown four acres of pease in drills: which, at the beginning of April, promised to produce a fine crop. But they are now almost all destroyed by an insect, never known before in this country. It is like a pope in

U 2

the

* This letter was written in answer to one, sent to Mr. Cox, by order of the Committee, desiring further information of the manner of tilling, and manuring the land for the experiments; and a particular account of the measure of the crop produced.

the malt : but of a brown colour : I have caught several ; but cannot find any thing that will kill them.

I am, Sir, your very humble servant,
MATTHEW COX.

S I R, Wallhampton, May 14, 1768.

I received your favour * this morning ; and one from Mr. Box, of the 30th ult. to the same purpose : which, I thought, I had fully answered. The land for the drilled wheat was prepared exactly the same as land sown in the common way : only the land for the drilled wheat was harrowed before the drill-plough went on. My drill-plough sows four rows, and harrows it. It was hand-hoed by children, as to the greatest part ? which cost me one shilling and four-pence per acre. The rest, my servant hoed. I had, on an average, twenty-three Winchester bushels per acre drilled. The expence of preparing the land is given below. In the account I sent with the wheat, you will find how each experiment was manured.

I am, Sir,
Your most obedient
Humble servant,

MATTHEW COX.

One acre of land sown in the common way.

			£.	s.	d.
First ploughing	_____	_____	0	7	0
Second ditto	_____	_____	0	6	0
Third ditto	_____	_____	0	5	0
Harrowing	_____	_____	0	1	0
Drag, &c.	_____	_____	0	1	0
				1	0
Two bushels of seed	_____	_____	0	15	0
				1	15
			One		

* This was in answer to a second letter, written by order of the Committee, requesting some further information as to the preparation of the land, the expence, and the produce of the grain.

One acre of land drilled.			£.	s.	d.
Three ploughings and harrowing	—		1	0	0
Sowing with the drill, one man and boy, at	}		0	0	4
1s. 4d. per day		—			
Hoeing	—	—	0	1	4
Lime	—	—	0	0	0
			1	1	8
One bushel of seed	—	—	0	7	6
			1	9	2

N. B. I had as much or more wheat from one bushel of seed sown in the drill way, as from two bushels sown in the common way. One bushel of lime, which costs seven-pence, is sufficient for twenty bushels of seed. As for the chalk, &c. I charge nothing to either, since the expence was the same. *

A R T I C L E VII.

PROCESSES for dying Leather RED and YELLOW, as practised in Turkey. Communicated † to the Society for the Encouragement of Arts, Manufactures, and Commerce, by Mr. PHILIPPO; and inserted here at their Request.

To Robert Doffie, Esq;

S I R,

THE Society for the Encouragement of Arts, Manufactures and Commerce, have directed me to deliver to you Mr. Philippo's processes for dying
U 3 leather

* It appears from this account, that two parcels of land proper for wheat, will produce, when prepared in the same manner with full manure, at least as much grain by the drill culture as by the broad-cast; and that at least a bushel per acre may be saved in the seed, in the drill way, compared with the quantity required in the broad-cast. The expence in the drill way, as practised here, including seed, was £.1. 9s. 2d. in the broad-cast way, £.1. 15s. 0d. Again therefore, arises, from substituting the drill method, instead of the broad-cast, of 5s. 10d. per acre, when corn is at the rate of 7s. 6d. per bushel; and proportionably at every other price, supposing both practised, with the small proportion of manure.

† The particular circumstances, respecting this communication, are related in the preceding History of the Society's transactions: page 189.

leather red and yellow, in order to their being published in the Memoirs of Agriculture, if you think proper.

By Order,

PETER TEMPLEMAN.

Processes for dying Leather red and yellow, as practis'd in Turkey; with directions for the preparation, and tanning the skins; communicated by Mr. Philippo.

ARTICLE I.

First preparation of the skins, both for the red and yellow dyes, by dressing them in lime.

Let the skins, dyed with the hair on, be first laid to soak in clean water, for three days. Let them be broken over the flesh side, put into fresh water, for two days longer, and afterwards hung up to drain, half an hour. Let them now be broken again on the flesh side, limed with cold lime on the same side, and doubled together with the grain side outward. In this state, they must be hung up within doors, over a frame, for five or six days, till the hair be loose; which must then be taken off; and the skins returned into the lime pit for about three weeks. Take them then out, and let them be well worked, flesh and grain, every sixth or seventh day during that time: after which let them be washed ten times in clean water: changing the water at each washing. They are next to be prepared in drench, as below-mentioned.

ARTICLE II.

Second preparation of the skins, for both the red and yellow dyes, by drenching

After squeezing the water out of the skins, put them into a mixture of bran and water, new milk warm, in the following proportions: viz. about three pounds of bran for five skins; and water sufficient to make the mixture moderately fluid: which will be about a gallon to each pound of bran. In this drench, suffer the skins to lie three days: at the end of which time they must be well worked; and afterwards returned into the drench for two days longer. They must then be taken out, and rubbed between the hands; the water squeezed from them; and the bran scraped off clean from both sides of the skins. After this they must be again washed ten times in clean water; and the water squeezed out of them.

Thus

Thus far the preparatory process of all the skins, as well those to be dyed red as yellow is the same: but, afterwards, those that are to be red, must be treated as follows.

ARTICLE III.

Preparations, in honey and bran, of the skins that are to be dyed red.

Mix one pound of honey with three pints of lukewarm water; and stir them together till the honey be dissolved. Then add two double handfuls of bran: and, taking four skins (for which this quantity will be sufficient) work them well in it one after another. Afterwards fold up each separately into a round form, with the flesh side outward; and lay them in an earthen pan, or other proper vessel, if in summer, by the side of each other, and if in winter, on the top of each other. Place the vessel in a sloping position, so that such fluid as will spontaneously drain out of the skins, may run from them. An acid fermentation will then arise in the liquor: and the skins will swell considerably. In this state, they must continue about seven or eight days: but the moisture, that drains from them, must be poured off once or twice a day, as necessity may require. After this, a further preparation in salt is necessary: which is to be performed in the following manner.

ARTICLE IV.

Preparation in salt, of the skins to be dyed red.

After the skins have been fermented in the honey and bran, as abovementioned, let them be taken out of that mixture, on the eighth or ninth day; and well rubbed with dry common sea-salt, in the proportion of about half a pound to each skin: which must be well rubbed, and worked into them. This will make them contract again; and part with a considerable quantity of moisture: which must be squeezed out, by drawing each skin separately through the hands. They must next be scraped clean, on both sides, from the bran, and superfluous salt and moisture, that may adhere to them: after which, fresh dry salt must be strewed over the grain side; and well rubbed in with the hands. They are then to be doubled, with the flesh side outward, lengthwise, from tail to tail: and more dry salt must be thinly strewed over the flesh-side; and rubbed in. For which

two last operations, about a pound and a half of salt will be sufficient for each skin. They must then be put thus, folded on each other, between two clean boards, placed sloping breadth-wise; and a heavy weight laid on the upper board, in order gradually to press out what moisture they will thus part with. They must be then continued in this state of pressure, two days, or longer, till it be convenient to dye them: for which they will then be duly prepared.

ARTICLE V.

Preparation of the red dye, in the proper proportion for four skins; and manner of application of it in dyeing the skins.

Put eight gallons of water in a copper, with seven ounces of shenan * tied up in a linen bag. Light a fire under the copper: and, when the water has boiled about a quarter of an hour, take out the bag of shenan; and put, into the boiling fluid or lixivium, 1st, Two drams of alum.—2dly, Two drams of pomegranate bark.—3dly, Three quarters of an ounce of turmeric.—4thly, Three ounces of cochineal,—5thly, Two ounces of loaf sugar. Then let the whole mixture boil about six minutes afterwards, over the fire.

Measure out two pints of this liquor; and put it into a flat earthen pan. When it is cool as new milk, take one skin folded lengthwise, the grain side outwards; and dip

* THE SHENAN is a drug commonly used in dying, in the East; and very easily to be obtained at any of the ports of Asia, and Africa, in the Levant. It is the *Eastern jointed Kali*, called by botanists, *Selicornia*: which grows in great plenty on the sea-coast, in those and other parts of the East. There is a less species of the *selicornia* on our coasts, particularly in Lincolnshire; which, from its very great affinity to the shenan, might be presumed to have the same qualities. On some trials, it has not, however, appeared to answer the end of the shenan. But it is proper to pursue the examination of this further; as some unknown circumstances in the collecting, or using the English *selicornia*, might occasion the miscarriage. The Eastern shenan may, at all events, be easily procured in any quantity, at a very low price, by any captains of Turkey ships, or other persons who may be at Aleppo, Smyrna, &c.

dip it in the liquor : rubbing the same gently in with the hands. Then, taking out the skin, hang it up to drain ; and throw away the superfluous dye.

Afterwards proceed in like manner with the remaining three skins : repeating the same operation, on each skin separately, eight times, before each fresh dipping ; and squeezing the skins by drawing them through the hand. Lay them now on one side of a large pan, set sloping to drain off as much of the moisture as will run from them without pressure, for about two hours, or till they be cold. Then tan them as here directed.

A R T I C L E VI.

Tanning the red skins.

Powder four pounds of the best white galls in a marble mortar ; and sift them till the powder be fine. Mix them with about three quarts of water ; and work the skins well in this mixture for half an hour, or more : folding up the skins four-fold. Let them lye in this tan twenty-four hours ; when they are to be worked again as before ; then taken out, scraped clean on both sides from the first galls ; and put into the like quantity of fresh galls and water. In this fresh mixture, they must be again well worked for three quarters of an hour ; then folded up as before, and left in the fresh tan for three days. On the fourth day they must be taken out, washed clean from the galls, in seven or eight fresh quantities of water, and then hung up to dry.

A R T I C L E VII.

Manner of dressing the red skins after they are tanned.

When the skins have been treated as above, and are very near dry, they should be scraped with the proper instrument or scraper, on the flesh side, to reduce them to a proper degree of thickness. Then they are to be laid on a smooth board ; and glazed, by rubbing them with a smooth glass. After which, they must be oiled, by rubbing them with olive oil, by means of a linen rag, in the proportion of one ounce and a half of oil to four skins : and then they are to be grained on a graining board length-wise, breadth-wise, and cross-wise from corner to corner.

A R T I C L E

ARTICLE VIII.

Preparation, with galls, of the skins for the yellow dye.

After the four skins are taken out of the drench of bran, and clean washed, as before directed (Article II) they must be very well worked, half an hour or more, in a mixture of one pound and a half of the best white galls, finely powdered, with two quarts of clean water. The skins are then to be separately doubled length-wise, rolled up with the flesh side outwards, laid in the mixture, and close pressed down on each other: in which state they must continue two whole days. On the third day, let them be again well worked in the tan; and afterwards scraped clean from the galls, with an ivory or brass instrument (but no iron must touch them:) they must then be put into a fresh tan, made of two pounds of galls, with about three quarts of water; and well worked in it fifteen times. After this, they must be doubled, rolled up as before; and laid in the second tan for two days. On the third day, a quarter of a pound of white sea-salt must be worked into each skin: and the skins double rolled up as before; and returned into the tan till the day following: when they are to be taken out, and well washed six times in cold water, and four times in lukewarm. The water must be then well squeezed out, by laying the skins under pressure for about half an hour, between two boards, with a weight of about two or three hundred pounds upon the uppermost board: when they will be ready for the dye.

ARTICLE IX.

Preparation of the yellow dye in the proper proportion for four skins; and manner of application of it in dyeing the skins.

Mix six ounces of cassiari gehira, or dgehirā, * or the berries of the eastern *rhamnus*, with the same quantity

* The CASSIARI GEHIRA is the berries of an Eastern *rhamnus* or buckthorn-tree; and may be obtained at Aleppo, or other parts of the Levant, at a small price, by the same means as the shenan. The common Avignon berries, or yellow berries, may be substituted; but not with so good an effect, as the cassiari gehira: which is a stronger and brighter yellow dye, as well for this use, as colouring paper hangings, and other purposes.

tity of alum; and pound them together, till they be fine; in a marble or brass mortar, with a brass pebble. Then, dividing the materials thus powdered, into three equal parts, of four ounces each, put one of those three parts into about a pint and a half of hot water, in a china or earthen vessel; and stir the mixture together.

Let the boiled fluid stand to cool, till it will not scald the hand. Then spread one of the skins flat on a table in a warm room, with the grain side uppermost; and pour a fourth part of the tinging liquor, prepared as here directed, over the grain side, and spreading it equally over the skin with the flat of the hands, rub it well in. Afterwards do the like with the other three skins: for which the mixture first made will be sufficient.

This operation must then be repeated twice more, separately on each skin, with the remaining eight ounces of the powder of the berries and alum, with the above-mentioned due proportions of hot water, put to them as before directed.

The skins when dyed, are to be hung upon a wooden frame, without being folded, with the grain side outwards, about three quarters of an hour to drain: when they must be carried to a river, or stream of running water; and well washed in it six times or more. After this, they must be put under pressure for about an hour, till the water be well squeezed out; and then hung up to dry in a warm room.

This being performed, the skins are to be dressed and grained, as before directed for those dyed red: except that they must not be oiled.

ARTICLE

ARTICLE VIII.

*Account of the Culture, and Use in feeding Cattle, of the
TURNEP-CABBAGE. * Communicated by ROBERT
COLVILLE, Esq; to the Society for the Encouragement
of Arts, Manufactures, and Commerce : and inserted
here at their Request.*

To Robert Dossie, Esq;

SIR,

THE Society for the Encouragement of Arts, Manufactures, and Commerce have directed me to deliver to you Mr. Colville's letter, in order to their being published in the Memoirs of Agriculture, if you think proper.

By Order,

PETER TEMPLEMAN.

GENTLEMEN,

THE principal motive to induce countrymen to come into any new trials, or discoveries, is to deviate as little as may be, from the usual practice in husbandry. Therefore I have stuck to the old method, in which I have always succeeded very well.

At Lady-day, 1766, I took twelve acres of plowed land into my own occupation, being in two pieces, in order to lay them down to grass, so soon as I have improved

* The confusion of the name of this plant with that of the turnep-rooted cabbage, or cabbage-turnep, which is the subject of the next article, and a different plant, may occasion mistakes of the one for the other, if attention be not given to distinguish them. This is the kind called the *turnep-cabbage* : which has an orbicular, or roundish enlargement of the main stalk, some inches above the ground ; and has long been known in this country as a garden plant ; but rather for curiosity than for use. The other, or *turnep-rooted cabbage* has not any such bunch on the stalk above the ground ; but the root is orbicular and large, resembling the turnep. This latter kind was a stranger, as far as appears, till last year, that it was cultivated, as related in the next article, by Mr. Reynolds.

proved them to my wish. Four acres, two roods, one of the two pieces, is a mixed soil of clay and fill; but, from bad management, very foul. After ordering it as well as the time I had would allow, I sowed it with turnep-cabbage seed, in the broad-cast way: which produced a very good crop; weighing, great part of them, from three to six pounds each turnep. Seven acres, and two roods, the other piece of the twelve acres, being marsh land, of a light, silly, hungry soil, I sowed, also, with turnep-cabbage seed in the same manner as before-mentioned; and it produced me as good a crop as I expected, from so mean a soil. The turneps weighed from two to four pounds each.

While I was managing these two pieces of land, I se my labourers to dig over two acres of a fat rich soil, that I had planted with timber plants five years before; and sowed them with turnep-cabbage-seed, in the same manner as before-mentioned; raking in the seed. This was but an indifferent crop, owing to its having been sown with the same sort of seed five successive years before, when full a third part became degenerated to a long, thick stalk, somewhat like to brocoli: which was very eatable, by cutting to pieces about an inch thick; as I do the turnep part when I give them to my cattle on pasture land.

I had several failing patches in the three pieces; and those I filled up by transplanting from the places where the plants were too thick. From the strictest observation I could make, before I stocked the land, I did not find so great a difference between the plantling and the seedling as to make it worth any person's while to be at the expence of planting his land with turnep-cabbage, instead of sowing it. Indeed, I have made the same observation for these seven years last past, that I have been master of this plant, and never found it otherwise.

Of the seven acres and two roods of cabbage-turneps, I parted off an acre of them with trammel netting, in depth, two feet eight inches; that cost me three-pence per yard (which is much the cheapest fence for that purpose;) and put forty-eight sheep into it, the 9th of December; being three weeks before the great fall of snow. When it came, it drifted against my netting, so
that

that it was level; and my sheep run over it into the other part, where they continued all the time of the snow, without any trouble to provide any other food for them; and did extremely well. When the snow (which lay on the ground full three weeks) was melted, I could not find, notwithstanding the turnep-cabbages were more than half eat, any quantity damaged worth notice: which is a sufficient commendation for the propagating this plant.

I put twenty-nine store-sheep into the acre after the snow was gone: which kept them well a fortnight: so that reckoning four-pence per sheep, per week, for forty-eight sheep three weeks; and three-pence per sheep per week for twenty-nine sheep; two weeks come to three pounds two shillings and six-pence per acre, which I let for no more to my tenant I took it from, than ten shillings per acre.

Of my plantation two acres, I gave part of the crop of turnep-cabbages to my feeding sheep at grass during the snow: and the remainder, I am now cutting up; and giving to my feeding beasts: which thrive extremely well on them.

I weighed (after cutting off the stalk close to the turnep part) four hundred and fifteen pounds, which were eat by five beasts of sixty stone each, at fourteen pounds to the stone, at three meals.

As to the four acres, and two roods of turneps, I shall cut part of them up, for my feeding beasts: which I hope I shall be able to send to Smithfield some time in April. The other part, I shall stock with my feeding sheep: which I shall clip about old Lady-day; and send them away.

Perhaps it may be thought strange, I should assert, there is little difference between the plantlings, and the seedlings of this herb,* after having sent you one of each sort: of which the seedling weighed to pounds, and a half less than the plantling. But the plantling was transplanted into a rich garden-ground, while the other continued in the mother-earth till I sent it to you: which is greatly the inferior soil.

There is this great advantage in the turnep-cabbages: as they stand about three inches above ground, they are to be cut up in the severest weather; and given to cattle, when the common turnep is locked up by the frost.

frost. And there is still a further advantage in the turnep-cabbages, that they require no washing: which saves a great deal of labour and expence.

I finished sowing, &c. the 23d of April, 1766. I gave them two hoeings, which is usual with a crop of common turneps. If any further information is required, be pleased to signify the same: as also the receipt of this to,

Gentlemen,

Your most obedient

Newton, near Wisbeach,
in the Isle of Ely, Cambridge-
shire, March 4, 1767.

Humble Servant,

ROBERT COLVILLE.*

GENTLEMEN,

IN my letter to you last spring, I gave you an account of my sowing fourteen acres of land, in three pieces, with turnep-cabbage seed; and, at the same time, acquainted you with the nature of the soil of each piece, the management, and benefit accruing therefrom.

I sowed in April last, twelve acres of the same land, in two pieces: viz. seven acres and two roods, and four acres and two roods, with turnep-cabbage seed: which answered as well in all respects, as those the year before, excepting about one hundred, † in the four acres and a half,

* This account of the turnep-cabbage was sent by Mr. Colville (now Sir Robert Colville) in claim of the premium for cultivating the turnep-cabbage: which was adjudged to him.

† This is a proof of the hardiness of the turnep-cabbage, the frost of last winter being very severe. But though Mr. Colville's plants escaped from his soil being favourable to them, most others of the same kind were destroyed by the rigour of the cold. In the nursery gardens, they were mostly killed; and I am informed of several fields where the same happened. Those, which were raised by Mr. Reynolds, among his turnep-rooted-cabbage, were likewise all killed, as we shall see in the next article. This shews that the turnep-cabbage, though hardy, is not so in the first degree; as it was
thus

half, was damaged by the frost, and not more : which is of so little consequence, that it is not worth mentioning. It would be needless to recapitulate over again the account, I sent you last year : as I have nothing new to mention. I am now sowing the seven acres and two roods with barley ; and, after it is harrowed in, shall lay it down to grass : sowing two sacks of hay seeds, and ten pounds of white Dutch clover seeds per acre.

In the year 1763, I laid down to grass, five acres of marsh land (the soil a hungry fill) in the same manner, which was lett at eleven shillings per acre, when I took it into my own hands. It has kept me forty sheep, and five beasts for three months in the summer, and fifteen sheep seven months in the winter, every year it has been laid down ; sparing it two months, the latter end of the year for a winter pasture. You will observe, by the following moderate calculation, the advantage I have reaped from its laying down to grass.

	£.	s.	d.
40 Sheep, at two-pence per week each, for three months	4	0	0
15 Sheep, at two-pence per week, for seven months	3	10	0
5 Beasts, at one shilling per week each, for three months	3	0	0
	10	10	0

I am, Gentlemen,
Your most obedient
And humble servant,
ROBERT COLVILLE.

thus destroyed in some lands last winter by the frost : while the turnep-rooted-cabbage, the two kinds of borecole, and the cole-feed, remained uninjured every where. The experiments made in consequence of the Society's premiums for the turnep-cabbage, have, therefore, afforded this light with respect to it, that though a hardy plant, compared with most others, it cannot be depended on in very severe frosts, if raised on rich, or moist soils.

ARTICLE IX.

An Account of the Cultivation of the TURNEP-ROOTED CABBAGE, now first introduced into England, as an Article of Agriculture; and of Its Application to, and Utility in feeding neat Cattle, Horses, and Sheep; together with a Method of destroying the Fly in Turneps. Communicated to the Society for the Encouragement of Arts, &c. in three Letters, by Mr. John Reynolds; and inserted here at their Request.

To Robert Daffie, Esq;

S I R,

THE Society for the Encouragement of Arts, Manufactures, and Commerce, have directed me to deliver to you Mr. Reynold's letters, in order to their being published in the Memoirs of Agriculture, if you think proper.

By Order,

PETER TEMPLEMAN.

Adishham, March 25th, 1768.
By Wingham Bag, Kent.

WORTHY SIR,

AS I apprehend, we have obtained a new * species of turnep-cabbage: which I look upon to be a very valuable acquisition truly.—A specimen of the plants may be seen at Mr. James Gordon's, seedsman, in Fenchurch-Street, next Tuesday: having engaged to send him a few upon Monday, by a Canterbury hoy, where Dr. Templeman, or any other gentleman belonging to the honourable Society of Arts, &c. may inspect them;

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X

and

* This species of cabbage with a turnep root is undoubtedly new here, considered as a subject of agriculture; and, as far as appears, has not before been brought into England. But it was well known to botanists: as will be shewn in the next article, from the description of authors; and is generally cultivated in the northern parts of Europe.

and be also informed by him (Gordon) of their good qualities for feeding of stock, so far as I have made trial hitherto. It has been but about two months since, we began feeding them off. They produce a marvellous deal of food : and that too, when most wanted now ; turneps being gone, and no other herbage to be had. This root is proof against frost, when most other vegetables are destroyed. This I say from experience on fair trial, this last winter. One single perch, or sixteen foot and a half square, taken up from a field of four acres (indifferently chosen) weighed two hundred and five pounds. In another piece, of about an acre and a half, the same quantity of ground produced two hundred and seventy-three pounds, taken up the 15th of February. Behold ! what a noble production this is ! Too much cannot well be said of its excellencies, so far as I am able to judge.

I rejoice to think of the great good, that may arise from this plant to the Public ; and the more so, as being the happy instrument myself of its introduction. For I never heard or read of this species of vegetable ; and, therefore, I call it new. Whether or no I am mistaken, let the connoisseurs judge.—This I know, that one acre well cultivated will produce a much greater quantity of more substantial food, than the best turneps I ever saw.—I look moreover upon these as more certain to the farmer, especially in hard winters, when turneps are often destroyed. Thus much, by way of information, I thought necessary.—I have no interest herein, but to serve the community : which I think is every man's duty : and, as such, what I have said is at your service. I am,

Worthy Sir, with all due respect,
Your most humble servant,

JOHN REYNOLDS.

P. S. The plants herein mentioned grew upon land, which rents at six shillings per acre.

I should be glad of a few grass-seeds, to make trial of ; in case any can be obtained different from the North American black, &c. Timothy : the first I have ; the second I believe is of little worth. Mr. Gordon will direct them to me.

May

May 13, 1763.

My LORDS and GENTLEMEN,
PURSUANT to your intimation, * I transmit to you an account of all my proceedings relating to the plant, called TURNEP-ROOTED CABBAGE ; but, before I enter on the subject, give me leave to acquaint you with the motives, which induced me to make trial of this plant. When I found, that there was a premium offered by your most laudable Society for cultivating this plant, † I began to think, that there must be some more than ordinary quality inherent in it, which you were desirous of introducing to publick view ; and rendering subservient to public good. This put me upon trying what I could make of it. But, at my first setting out, I laboured under difficulties. No seed could be had in England, ‡ neither from seedsmen, nor gardeners : as far as I could find. They all said, that it was not worth

X 2

the

* The preceding letter was referred, by the Society to the Committee of Agriculture : and the subject of it appearing a matter worthy the most serious attention, they desired Mr. Reynolds to give the fullest information he could, with respect to the culture, &c. of this plant ; and, especially, as to some particular points specified : which he has here accordingly done.

† Mr. Reynolds does not here mean the plant, which is the subject of his letter : as it was never brought in question before the Society till by himself ; but the species called the turnep-cabbage, that is commonly known : and for which the Society have offered premiums ever since the year 1765 inclusive. That kind is a very different plant from that of Mr. Reynolds : not producing a turnep-root, but only a bunch or enlargement of the main stalk, some inches above the ground : which a little resembling a turnep in form, occasioned the plant's being called the *turnep-cabbage*. The other for distinction, therefore, is properly named the CABBAGE-ROOTED TURNEP ; or may, for brevity, be called the CABBAGE-TURNEP : which will sufficiently distinguish it from the turnep-cabbage.

‡ Mr. Reynolds might have been supplied with whatever quantity he could want of this seed in England, if he had known where to apply for it, Mr. Sheilds near Lambeth,

the propagating. Recourle was then had to a noted seedfman in Holland for the beft fort of turnep-cabbage feed, to the amount of fix pounds. But he was able to procure me only one Dutch pound; and faid it was the growth of Ruffia; and that both the Swedes and Ruffians gave affurances of its ftanding the froft, in thofe * fevere climes. This gave me great encouragement to proceed.

CULTURE of the GROUND, and MANNER of RAISING the PLANTS.

A piece of ground, confifting of a gentle hazel mould, fixteen perches in quantity, was, accordingly, long before made ready, by three good plowings. This land was ftirred again on receiving of the feed; which made a fourth plowing. The feeds were fown on the 15th April 1767. As there was room allotted for the growth, there was no neceffity for planting out till the weather was fuitable for the purpofe. The plants could not, in this cafe, draw, and fpoil one another, according to the gardener's term. It may be neceffary, that I fhould mention

Lambeth, having then a fufficient flock. But the fame difficulty has occurred to many others, as well as to Mr. Reynolds, in obtaining this and other feeds, for which the Society have offered premiums. This has been a great impediment to the fuccels of their premiums. But it is now removed by their giving notice in their premium books, and advertisements, "That the trees, plants, cuttings, and feeds, for which they offer premiums, may be had of Mr. Shields nurferyman at Lambeth: who has undertaken to fupply the fame good, and on reasonable terms." Mr. Shields, in purfuance of this agreement, contracted with Mr. Reynolds for taking part of the feed of this new kind of cabbage, or turnep, raifed by him; and is prepared to anfwer any orders for it.

* The Dutch gardener informed Mr. Reynolds very rightly, that this fpecies of cabbage, or turnep, is cultivated both in Sweden, and Ruffia, as it is alfo in Denmark, and the other northern parts of Europe; where it ftands the extremeft froft; and is therefore, in that light, preferable to other turneps in thofe countries.

mention in this place, what the state of the field was, in the year before the plants were transplanted into it. Two acres of it had been a fallow; two acres in oats: and one in rye; the whole piece consisting of five acres. In order to see, what effect dunging would have thereon, a certain part of this field was thick folded with sheep's dung: the fold passing quite through the whole field length-wise; by which means it covered part of every different soil. The other parts were left unfolded. This was done, in order to see the different effects, the dung might have one way, or the other, upon each soil. The field, chosen for my purpose, had in it different soils, intermixed with each other, viz. clay or brick-earth, strong cledge, flint gravel, or stony ground, gentle loam, hazel mould, and a small patch of crumbly chalk. It was of a very irregular figure; surrounded by woods; and of course well sheltered from cold winds.

Knowing, that all the cabbage tribe required deep earth to root in, I caused three acres to be plowed of different depths, viz. ten, twelve, and thirteen inches. This was done quite through the whole field length-wise; by which means, the plough passed through all the different soils in one furrow thick and thin: oats, rye and fallow, all together. The other two acres had only common plowings. This was performed about the middle of December 1766.

The second plowing was cross-wise; which we call balking: a term used for striking furrows of a good depth, ten rows to the rod. This was performed January 1767. The third plowing was done in the same manner, towards the end of March, 1767. This, we call splitting of balks. Previous to this last, the balks were harrowed down dry. The fourth, and last plowing was towards the end of the May following, length-wise, exactly of the same depth with the first plowing. In this manner, were the plowings, which were performed dry, compleated; and thus did the land lie still within two or three days of planting. Then it was well dressed; a term used for harrowing and rolling, that the ground might be sufficiently fine to receive the plants. This should be performed sooner, if the weather be suitable: lest it should prove too dry at the time of transplanting.

TIME and MANNER of PLANTING.

We began to transplant at the latter end of June, 1767. This was performed in rows across the field : some at two feet intervals ; some at two feet two inches ; and others at two feet four inches.

In the first, the plants were two feet apart in the rows : in the second, they were twenty-two inches : and in the third, they were in general twenty inches : but some few were two feet ; and others eighteen inches. Four acres were planted in this manner : and, by way of trial, we planted also several rows of common cabbage ; two sorts of brocoli, called favoys, and Siberian borecole, commonly called Scotch kale. These, with some coleworts sown in the broadcast-way, completed the field. The plantings were performed, as fast as the plants advanced in bigness ; so that a few days intervened betwixt the several times. Yet the whole was finished before the end of July. Frequent showers often followed ; and all grew to admiration. But a little time discovered, that we had only a small sprinkle of the common turnep-cabbage, among the whole : not more than one hundred plants per acre, one with the other, throughout the plantations.

This somewhat alarmed me : but finding, however, that I had got a new species of plants, which neither myself nor even the most skilful in the knowledge of plants knew any thing of ; and liking their countenance ; I treated them in the best manner I could. The common cabbage, the two brocolis, the favoys, and Siberian borecole, together with the sprinkle of common turnep-cabbage, were all treated alike with these new guests : save only, that the former were planted further apart. Mark the event ! None but the borecole, and these new comers survived the frost. Every individual plant besides was destroyed thereby. An instance this of the superiority of this new species over the other sorts : particularly in its being impenetrable by frost. But to proceed. We made use of a trowel for the purpose of planting, instead of a dibble, or dipper (a model of which will be sent.) This instrument, penetrated easily into the ground, the depth required : the planter then pulled the earth after him ; and placed the plant, up to the foot-stalk of the leaves, behind the trowel, in a sloping

sloping posture, towards the mark in the line, which was made use of for planting, before the trowel was drawn out of the ground. The plant being thus placed, the planter then trod the earth close with his foot : whence the ground by hard pressure sunk a little lower than the surface : whereby it was enabled to receive the rain more effectually at its roots.

Two men worked at one line : which was marked at the distance designed for the arrangement of the plants. A number of plants sufficient for one row were laid at each end, by the drawer of them. The planters dropped the plants at the marks, till they met at the middle of the line. Then returned back : planting at the same time : and each man getting at the end of the line together, they removed it to the required distance ; and so proceeded. The stones, clods, or bits of chalk, were brushed away, with the trowel at the mark ; so that none of them, nor any dry earth entered the ground with the plant. This method, I have found to be far the best of any in planting of the cabbage tribe ; and madder too.

In a short time after the planting, the hand-hoe was applied to the plants in the rows ; which nourished them greatly. The horse-hoe was made use of for the intervals, three several times ; according as the weeds advanced. The last hoeing was in February last. The earthing them up gradually by horse-hoeing proved to be very useful ; as they became thereby well screened against the frosts. This, likewise, prevented any ill effects from the crows, and rooks : which are great enemies to this plant, by picking holes therein ; and occasioning, thereby a decay and rottenness. I should observe, that I made use of two kinds of horse-hoes : a prong, and a plate-hoe. The former was about fifteen inches wide, for the first hoeing ; and the latter about a foot. Both were made to fit one and the same wood-work. The hand-hoe was six inches and an half wide. One horse and man hoed four acres in a day. I mean the intervals only for the hand-hoe did the rest, as occasion required.

D I F F E R E N T P R O D U C T.

THE effects were, that those plants, which were on the clay, or brick-earth soil, did not return out to be so

good by one half as some of the other ; nay, they were the worst in all the field.—Those on the stiff cledgy land were but little better : they weighed something more than the other.—The stony, flint gravel, gartle-loam, and hazel-mould, were but little different from each other. I give the preference to the latter. The plants on one perch, indifferently chosen, where the deep plowing was performed, being taken up, the 15th of February, weighed two hundred and fifty-four pounds : another taken in the same manner on the 26th of March, weighed three hundred and ninety-three pounds. A third taken from the same ground, on the 27th of April, weighed four hundred and seventy-six pounds. The number of plants, which produced these, were sixty-eight, and no more. Yet those on the crumbly soil exceeded this by four pounds : the weight being four hundred and eighty pounds : and the number of plants the same, viz. sixty-eight : a vast return, notwithstanding I see my error in consuming them too soon. For what were taken up in February, would now maintain twice as much stock, as they did at that time : as they are, this 13th May, as good as ever. Whereas turneps grow stinky, when going to seed ; these do not. My sheep spoil none ; but eat them up, both root, and branch, with great gladness of heart. A circumstance of no small weight is, their thriving best on dry ground : inasmuch as they are better fed off on such soils, than on those that are cold and wet. For my part, I, in short, know not which to admire most, the wisdom, or the goodness, of Providence, in the formation of it.

In order to gain as much experience as possible, in the cultivation of these roots, I prepared an acre in another piece of ground : on a small part of which was laid two cart-loads of good dung, and mould mixed together : which was spread, as is usually done for corn, before the first plowing. Here the plowings were performed, in the same manner as in the five acres, at twelve inches deep. After this, two cart-loads more of the same dung were laid on at another place, on the surface of these plowings : the soil being poor, thin, and chalky. Besides that it never had any manure whatever, within my memory, but what it had from these deep plowings only. There we planted, at two feet intervals, and eighteen inches apart in the rows. I made this trial, mere-

ly through curiosity : not expecting the least advantage thereby. Yet, to my great surprize, the growth on this poor ground was every where alike : no distinction could be made betwixt that with the dung and mould, and what was not dunged. And, what is more extraordinary, the produce of this, when taken up, was equal to that of any one acre in the other field : one perch of it weighing, on the 15th of February, two hundred and eighty-four pounds. A specimen of this, after it had been twice eaten off by lambs, was sent to Mr. Gordon, seedsmen, in Fenchurch-Street, for the inspection of the gentlemen belonging to your Society : as a proof of the utility of this plant : and as a proof likewise, that no dung is required in cultivating it : and that deep plowing, or tillage, only is sufficient. The horned cattle are fond of the herbage of this plant. They may be eaten off more than once, if required. We are now, this 13th day of May, feeding off half an acre, with six milk-cows and a bull, the second time, in the five-acre piece : which was eaten off all the winter by the game. We find the milk, and butter, exceeding sweet, and good. If full grown sheep be put in, before they are designed to be totally consumed, they fall immediately upon the roots : which will occasion them to rot. But lambs will not do the same. We eat off with them, after weaning, half the acre in the chalky soil, twice ; first in November, 1767 ; and a second time in January, 1768 : at a time when the weather was very severe. These two feedings were made by way of trial, to see what effects it would have, both on the lambs, and the growth of the plants. The lambs thrive very well ; and liked their entertainment. Further, in order to try, whether, or no, sheep would live upon these roots only, without any additional food, I fenced off half an acre, in this same field, which had been eaten off, once before, by lambs : viz. in December, 1767. I turned in one hundred and eighty-three sheep. in February, 1768 ; but took them out every night to fold, that they might not touch the roots with dung ; nor spoil any by lying among them, &c. Here they were maintained fourteen days in great plenty. Nothing more was given them, besides these roots : and I never wish to see them thrive better. Had they been fed upon turneps, the sheep would have required hay, straw, or some other herbage besides. This I deem no inconsiderable saving.

Happy

Happy event, that such good food ; and that in great plenty ; can by industry, be extracted from soils, where little or nothing could be expected ; and, let me add, at a season of the greatest scarcity !

In order to the consuming them, they were dug up occasionally with a four-prong fork. My shepherd took up, in three or four hours, enough to maintain two hundred and fifty sheep for a whole day. When spent on the ground, they may be sliced, if required, and used in the stalls for horned cattle, &c. I have reserved some for seed : which have been twice horse-hoed : this spring : viz. in February, and April. They make a most delightful appearance at this time : but when the seed will ripen I cannot yet judge. I am apt to believe in July. Should the season prove kindly, I hope to have a considerable quantity of seed to dispose of : besides what I shall want for my own use.

R E M A R K S.

It is not necessary to be very nice about, or pay a particular regard to soil for the turnep-rooted cabbages, as they will grow on poor lands as well, if not better, than on such as are wet, strong, and stiff : and that too, without any sort of dung, or manure whatever, provided the plowings be duly performed. Dry lands, or such as may be made so, are most likely to succeed. Yet, let it be observed, that the last summer was uncommonly wet : which might greatly favour the poor, dry land : and injure the stiff, cold, and cledgy.

The ten inch plowings were equal to those of twelve and thirteen on every soil in the field ; except the flint gravel, and crumbly chalk : on these two soils the plants were best, where the deeper plowings of twelve and thirteen inches were performed. But the common plowings throughout the whole piece, did not produce, one with the other, more than two-thirds of what the deep plowed grounds amounted to. Hence the necessity of plowing deep, in order to cultivate this plant successfully ; as common plowing will not do.

The foldings in this field seem to be useless : no marks appearing from the dung in the least degree : the unfolded parts being equal to those that were folded. Whence, I conclude, that deep plowings only are sufficient

cient without dung: for so I call folding, tho' not in the highest degree. The greatest weight of food was on the two foot intervals, with eighteen inches in the rows. This distance is, therefore, recommended. If the plants be nearer, there will not be proper room for the horse-hoe: on which, much of the success depends.

The ground, we see, may be stocked in winter as occasion requires. I do not advise this. The owner is to use his own discretion. The five-acre piece eat off by the wood animals, points out what might be done in time of distress; which might not otherwise have been known. Maiming a vegetable certainly checks its growth. I find the seedling plants, in their natural state, much superior to the others, that were eaten off.

The winter herbage will undoubtedly pay the expenses of planting. The feeding of the lambs on the chalky soil, proves to be worth at least fifteen shillings per acre.

That the plants keep improving daily, from the time of planting, to the time of spending them, is demonstrable in both fields. The weight being near double, the 27th of April, to what it was the 15th of February, a circumstance this, duly to be regarded.

As the flies will be apt to fall upon and destroy the young seed-plants, to prevent the great inconvenience thereof, use the following remedy. Mix the intended seed with long-top raddish-feed; which the flies much admire. The raddish leaves being quick growers, will entertain these insects until the other seed plants get out of the way. But if they are very numerous, run a light roller over them night and morning, whilst the dew remains. This will lick most of them up, if duly performed. For a little moisture causes both them, and the earth, when clammy, to stick to the roller; by which means the enemy will be removed; and the young plants no ways injured thereby. A large field will require two or three rollers to perform this effectually. The smallest should be not less than twelve inches in diameter. I have had three rollers going all night, from eight or nine, to five or six o'clock next morning; and this repeated for three nights successively, and once for four. This was in the year 1739: a year fatal to turneps. By these two methods, I saved all my growth, when there were scarce any field turneps besides

tides in Kent. What was still more remarkable, that same year the French lost their crops, likewise, in the same manner : and I sold to them great quantities, the winter following.

There is, says a wise king, " that which is destroyed " for want of understanding." This may be applied to the common method of raising, and managing turneps. It certainly is a great fault to have turnep-ground, when finished, rolled down : a common practice this, but very injurious to these young seed-plants. Because the clods, and pieces of earth are very useful in screening the plants from the sun ; and in quickening of their growth to a very great degree. It is well known, by the skilful, that shade promotes the growth of these young plants the most of any thing, in the first stage of life. For when they are exposed to the scorching heat of the sun, at this season, they make little or no progress : so that if the flies seize them, they are soon gone, a first, second, and third time, unless friendly showers come to their relief. But when they remain, on the other hand, unrolled ; they will be ten or twelve days growing, before they are fully exposed to the sun's heat ; or rise above the surface of the earth. By this means they gain much more strength to struggle with the enemy : and there is thrice as much food for the flies, as in those of the above stunted growth. Should rolling moreover become necessary, in either case, as soon as the flies appear, the unrolled ground will have infinitely the advantage of the rolled, in admitting of the destroying them. Because being rough, the roller, in passing over the flies the first time will, by breaking the clods in pieces, and by tumbling the earth about them, both bury and crush, as well as lick up, much the greatest part of these insects : and the raddish-tops will maintain those that remain, as long as it is needful. This is almost self-evident, did not experience confirm it : and, therefore, an article well worthy of regard.

N. B. One pound of raddish-seed is sufficient for ten or twelve pounds of turneps. But cabbage, and collichflowers require more, especially the latter. I never saw the premium for destroying the flies in turneps till too late. Else I should have become a candidate. What good that has brought forth, I have not learnt. I trust, what is now offered, as well as my other small efforts, will

will have its due weight with Gentlemen of such distinguished judgment and benevolence, as this honourable Society is composed of. That your truly patriotic designs, and endeavours, may be ever attended with all imaginable success, is the hearty wish of,

My Lords, and Gentlemen,

Yours, &c.

Adisham, May 13, 1768.

JOHN REYNOLDS.

As I am little known in the world, nor yet to the Society of Arts, &c. it may not be improper to refer you for an attestation of the above-mentioned truths, either to the Rev. Dr. Walwyn, prebendary of Canterbury, and rector of our parish: or to Mr. Lucas, his curate.

ADDITIONAL REMARKS.

The horccole, although much inferior to the turnep-rooted cabbage, is by no means to be despised. It may be made useful in feeding of cattle, when sown in the broad-cast manner, after a crop of pease, or fallow-plowings; as turneps and cole-seed are managed. But should be hoed out properly: and, seeing it withstood the severity of the frost, it becomes the more valuable on that account: more especially, as it falls in late for use, after turneps are spent, and gone,

This hint may not be, perhaps, useless, though foreign to the inquiries.

WORTHY SIR.

Adisham, May 17, 1768.

HEREBY you will receive my answers to such matters as have been required by the honourable Society of Arts, &c. on your letter of the 21st of April last, concerning the manner and method of propagating, and cultivating, the turnep-rooted cabbage, &c. together with some other useful instructions, which I hope will be acceptable, knowing their utility. The particulars of them are set forth in the inclosed sheets: which, I trust, will prove very beneficial in the end, both to my brother farmers, and the whole community, when known.

And although I have been as concise as the nature of the thing will admit of; yet this has drawn the account
to

to such a length, that it may be deemed rather a history or treatise, than a letter. Nevertheless, I hope the substance will be acceptable, and satisfactory, as to all those particular things sought after, relating to the turnep-rooted cabbage.

You will see, on perusing the sheets, under the Article of *Feeding Cattle*, that no time has been lost in giving you a more early account of these plants. Because they are not all yet consumed. We are now feeding them off with milch-cows, in order to see what effects this plant may have on the milk and butter of such cattle: a very essential thing. The knowledge of the utility of it, with respect to other horned cattle has, indeed, been obtained long before, viz. in the winter, with very agreeable circumstances: and now I can affirm the same of these. No one can desire either better milk, or butter, than the herbage of these excellent plants have produced, for these ten days past, and both in plenty too. Herein I do rejoice.

Be assured, that I have given a plain, simple, fair account, in the sheets before you, of all my whole proceedings with the strictest regard to truth; and such persons as are inclined to propagate this plant, may safely depend on them, if they be followed: and no doubt the success, will be answerable to their expectations, if experience can warrant any such thing.

I have sent a few more of these roots for further inspection of the Society, viz. those we are now spending with milch-cows; and such as stand for seed in their natural state; to the end the curious may see the whole fruits of my work: and be fully convinced of its utility: than which, none can do more.

Besides another motive induces me, to send these specimens too.—There are some marks (or fresh shoots) on the root of this plant, that leads me to think, they are more than annuals. For the buds, and long fangy roots seem to point out a longer duration than one year.—Here let connoisseurs judge. A little time will discover this.

Whatever has dropped from me, relating to this plant: or to the better management, and preservation of the turneps, culture, &c. that the Society thinks may be of service to the public, is totally devoted to their
service

service (under proper corrections) to do whatsoever they shall think meet. It never was my design, they should be kept in obscurity. For I know of no better service, that I can do my countrymen, than that of pointing out better ways, and means, for procuring us more plenty of bread: the which, I pray God to grant, Amen.

I am, Sir,

Truly, your humble servant,

JOHN REYNOLDS.

May 14th.

Mr. Reynolds's compliments to Mr. Box, desires his acceptance of a bit of butter (churned yesterday) made only from the herbage of my turnep-rooted cabbage, which I flatter myself will be acceptable, as a curiosity: being, I dare say, the first ever made in England from this plant, or perhaps in Europe. The two pieces are designed, one for your own table, and the other for the Gentlemen of the Society, as a specimen to be produced with those plants coming up; which I hope you will receive on Tuesday next, with an answer to your letter of the 21st of April.

Upwards of twenty pounds of this same butter was this day at Canterbury market: and all that have tasted it (which are not a few) think it exceeding good.—But two or three days may, and often do, make a difference in fresh butter.—Such are the fruits of my labour. I desire Dr. Templeman may taste it, if you please.

I am, Sir,

Your friend, and humble servant,

JOHN REYNOLDS.

ARTICLE X.

Further Observations on the general Nature of the TURN-NEP-ROOTED-CABBAGE; and its Uses, as well as an esculent Plant valuable for the Table, as for the pasturage of Cattle.

THE plant, of which an account of the culture and utility is given in the preceding article, by Mr. Reynolds, is, according to its botanical characters, a *brassica*; under which, as a name of the genus, the various species of the cabbages and turneps are promiscuously placed by Linnæus, and the modern botanists; as agreeing with each other, according to his system of the classes of plants. In the æconomical consideration of them, however, cabbages and turneps carry a notorious distinction. As they differ in appearance: and the root of the one, and the herbage of the other, are eaten. The great affinity, which the root of this kind of *brassica* in question, has with the turnep, in relation to form, consistence, and flavour; as well as aptitude to the same uses; may, therefore, make it be deemed, in that light, rather a turnep, than a cabbage: the root being the principal part, which is likely to prove of utility with us, as a substitute for the common turnep. This plant is, however, comprehended in the fifth species of *brassica*, or the *brassica radice caulescente tereti carnosa*. (*English sea-cabbage*) by Linnæus, in his *Species Plantarum*; and it is enumerated there, among the varieties of that species, by the distinction of *brassica radice napiformi*: Tournefort. Whether it be an original production of the *brassica* genus, with a turnep-like root; and, consequently, properly itself a species; or whether a seminal variety of the sea-cabbage; is, nevertheless, not clear. It is cultivated very extensively; and appears constantly to preserve the peculiarity of its orbicular root: whereas seminal varieties sport, to use the gardener's phrase; and are apt to run again into their original state.

This kind of cabbage with a turnep-root, therefore, though its appearance be novel here, is well known to botanists. It is noted, and described in several of the

more

more minute of the former writers on the species of plants. It is called the *rapo-brassica*, by Gasper Bauhin : and the *brassica radice napiformi*, by Tournefort ; who thus describes it :

“ It has a root much like a turnep, very fibrous, and hairy ; so that it may be said to be bearded, on account of its many and small fibres. It frequently has a fibre thicker than a man’s thumb, yet still the main, and original root, is more tuberous, and larger ; and thus resembles a turnep. From this root rises a stalk, a cubit and an half high, smooth, round, and branched into several arms. The leaves, at the root, with their oblong foot-stalks, are a palm long, like the sea-cabbage ; roundish, and cut into deep jaggs. But those, which rise from the stalks, are oblong, narrow, sinuated, and without foot-stalks. The flowers are large, and yellow ; and of a deeper colour than those of the common kind of cabbage : standing upon long foot-stalks, springing from a stalk above a palm high ; and not ranged in any regular order. To these succeed narrow cods, an inch long.

“ It grows in the colder parts of Bavaria : but especially on the mountains ; and about Bohemia. The root may be eaten : and some dress it like colliflow-ers. The poorer sort of people cut it small : as they do turneps.”

The description here given is not very accurate. But this kind of brassica may, nevertheless, be easily distinguished by it, from any other. The root is apt to run into a greater number of large ramifications than seems here intimated ; by the mention of one only. It has generally several ; and not solely one such ramification, or fibre, as it is here called, which are thicker than a man’s thumb, at their insertion. It may be added, that the roots are, also, larger than those of the common turnep : and that, in taste, and consistence, it is very like the kernel of the cocoa-nut : being much firmer, more oily, and less succulent, than the common turnep.

This kind of cabbage, or turnep, has either never before been brought into England, or at most has been very little dispersed. It seems wholly unknown to Mr. Miller, by his failing to distinguish it in his dictionary from the common turnep-cabbage. In his enumeration of the species of the brassica, he introduces one under

the name of *brassica radice caulescente orbiculari foliis sessilibus*: to which, he subjoins the English name of turnep-rooted cabbage. These names would seem to have relation to the true turnep-rooted cabbage, though Mr. Miller meant really the common turnep-cabbage; that has not an orbicular root, but an orbicular bunch or enlargement of the main stalk near the root, but above the ground; which somewhat resembling a turnep, has occasioned the name of turnep-cabbage to be given to the plant. That this, and not the kind with the turnep-root, was solely what Mr. Miller had in view by his turnep-rooted cabbage, is clear from a passage, that occurs in his speaking of it: where he says, that "it is the globular part of the stalk, which is eaten." But notwithstanding this only was the kind, on which, he bestowed the title of *brassica radice caulescente orbiculari foliis sessilibus*, he added, as a synonym, the name of *brassica radice napiformi*. Tournefort Inst. R. H. 219: which, as appears from the above description cited from Tournefort, is a different plant, in this view of specification. And indeed Tournefort has noted the other, or the common turnep-cabbage distinctly, under the name of *brassica cogylode*, and *brassica caule rautum gerens*, Dod. Pempt. and says, "the mark by which it is distinguished from all the rest, is this, that the stalk, under the leaves, is short, and swells to a bunch like a turnep." It may be reasonably concluded therefore, that Mr. Miller never saw this kind with the turnep-root, from his not distinguishing it from the other, but confounding them together in the names, as well English as Latin: nor, on an extensive enquiry, do I find any other person, who has met with it in England before. The Dutch gardener, to whom Mr. Reynolds applied, as is mentioned in the foregoing article, for the seed of the common turnep-cabbage, was not better acquainted with the distinction of the two kinds; and sent over the seed of the turnep-rooted cabbage, instead of the other. He said, it was of the growth of Russia: which may be very true: as this plant is cultivated there, and, indeed, in all the very northern parts of Europe for use. But he need not have sent so far as Russia for it. Since the plant is very common in Holstein, and other neighbouring parts of Germany, for the table. It is, however, more extraordinary, that this parcel of seed should be
mixed

mixed with a proportion of the common turnep-cabbage : which would not fare so well in the keen frosts of Russia. As all the plants of it raised from this seed were killed by the cold of last winter : That kind, though in some use formerly, as an esculant plant, is very little cultivated any where now, but as a curiosity : except what has been produced lately for feeding cattle, in Ireland, and here, as above mentioned.

Mr. Reynolds, therefore, justly claims to be the first, who raised the true turnep-rooted-cabbage ; or, as it may be called, for shortness, **CABBAGE-TURNEP**, in England. It is very fortunate for the public, the seed of it fell accidentally into his hands. As his industrious care of the young plants, when he perceived them to be strangers ; and his intelligent and ingenious management of them, in order to discover the best method of cultivation, and utility of their species in agriculture, will be the occasion of rendering the matter beneficial to our country, in a much quicker, and more extensive way, than could have happened from the ordinary course of proceeding. This holds particularly good of the sagacious experiments, by which he attempted to apply the principles of the new husbandry, to the cultivation of the plant, and substitute tillage for manure. As he has demonstrated thence, that the expence of manure may be spared ; and that moderately deep plowing, earthing the roots, and horse-hoeing, will be sufficient to produce the most copious crop of this plant. His application to the Society, by presenting them, with an accurate and full account of his experiments, and the result of them, was not less judicious ; and will doubtless be a very great means of promulging the knowledge of, and exciting an attention to this momentous acquisition, as it at present appears to be.

The turnep-rooted-cabbage, nevertheless, though so much a stranger in England, is very well known in the northern parts of Germany ; and in Russia, Sweden, Denmark, and most probably all the North. If it had no other excellence to recommend it, the experience of its hardiness would of course have established its use there preferably to the other kind of turneps : which must, in those countries, be either taken up at the end of the autumn, or be destroyed by the frost. As its effects on them is so certain that the particular degree of cold, according to Farenheit's thermometer, is stated ; which, is

found, on the cessation of the frost, constantly to reduce them to a mecilaginous pulp. This may be easily accounted for, by the action of freezing : which expanding the aqueous parts, that so much abound in the turnep, must burst, and tear up all the vascular fibres; and wholly destroy the vegetative œconomy. The turnep-rooted cabbage on the other hand, bears the most intense frost, and admits of being cultivated in very high latitudes. A gentleman of distinguished knowledge in Natural History, who was a native of a part of Sweden, that lies in 66° latitude, on the confines of Lapland, declares, that this kind of turnep was commonly cultivated there; and suffered no injuries from the cold. He informed me, also, that this kind was preferred in Sweden to any other turnep for the table. It is extraordinary, that a plant, with such valuable qualities, so well known in the neighbouring countries, should not have made its way here sooner. But the acquisition of it now, and the manner of its being obtained, is a striking instance of the benefits that will arise to mankind in general, and particularly to our own country, by that inquisitiveness after new subjects and modes of culture, and spirit of research after improvements, which the present times possess; and which has been greatly promoted by the example and influence of the Society for the Encouragement of Arts, &c. Indeed, this discovery was immediately owing to an attempt in pursuit of one of the views of that Society, by an intended candidate.

It is not the great hardiness only, which suits the turnep-rooted cabbage particularly to the purposes of husbandry. The retaining its full plumpness, and soundness, even till it be run to seed, a quality in which the common turnep is wholly deficient, renders it capable of affording a supply of food for cattle, at the end of the spring, when turneps would fail : which, in unfavourable seasons, when fodder is dear, must be productive of very considerable advantages. Mr. Reynolds has experienced this : and writes, in a private letter, “ I am unable still to say of what duration this
 “ plant is. For I find, though it is now July the 8th,
 “ the roots are making fresh shoots daily, in those
 “ plants lately cut for the seed : and withal, seem as
 “ firm and sound as ever. A marvellous plant, indeed!
 “ deed! and truly worthy cultivating, be assured,

“ in

“ in every respect, whether for the table, or cattle.”
 Mr. Reynolds will, indeed, seem to have just ground
 for his admiration of this plant, if we make just allow-
 ance for the contents of the following extract from ano-
 ther of his letters, dated June 17: “ I have the plea-
 “ sure to say, that I have raised, this last April, plants
 “ in number sufficient for six acres, or more: one half
 “ of which is already planted; and the remains will
 “ soon be so, as the weather is now favourable. I
 “ make no doubt but the sowing in July will succeed
 “ very well. For such may be got and planted by
 “ Bartholomew-day, no doubt; and these will come
 “ in when most wanted, in March and April, for
 “ feeding stock: and there is no better food for cattle
 “ under the sun, nor any one plant, which has been
 “ yet known, that will produce such an immense quan-
 “ tity of food as this I am treating of: which no farm-
 “ er should be without, that has it in his power to
 “ raise it. I could say more in praise of its utility,
 “ were it necessary: but let what has been said suffice.
 “ N. B. My design is to plant fifteen acres more, as
 “ soon as the pease are off: which will make the
 “ whole I shall have planted, twenty-one acres com-
 “ plete.

“ One particular, not mentioned in my letters to
 “ the Society, is very remarkable. The last half acre
 “ spent, in the five-acre field, although eaten off
 “ all the winter long, produced, at least, seventeen
 “ tons of food in May: and maintained six milch cows,
 “ one heifer, and one bull, sixteen days on the her-
 “ bage only. The roots afterward kept one hundred
 “ and sixty-two tegs (sheep a year old) twenty-five
 “ days; all in the utmost plenty. Was ever any thing
 “ like this introduced before, think you?”

This crop, amounting to thirty-four tons per acre,
 is certainly very large, compared to the product of most
 other plants. But the turnep-rooted cabbage cultiva-
 ted on land more suitable to it than that on which Mr.
 Reynolds raised this quantity, which, according to his
 own account, was only worth six shillings an acre, though
 in Kent, will yield a much greater. According to his
 own relation of their size, and the specimens he sent to
 the Society, the roots of his plants were not near so
 large as they have been found on the soils that are most

fit for them : and the reason is evident ; as his ground, though of various qualities, was too stiff or hard for them. They require a loose earth, such as would be proper for carrots, as the tap-like ramifications of the root strike a considerable length downwards, where they meet with small resistance ; and supply more nutrition to the body of the root. A sandy soil, therefore, if not poor, would be best.

On the whole, this plant must be esteemed a very valuable acquisition to husbandry. The resistance to all frosts, and even such moisture as will destroy the common turnep ;—the duration throughout the whole year ;—the admitting of being raised on ground not rich, and without manure ;—and the greatness of the produce, with its wholesome and nutritive quality ;—all these render this plant far superior to any of those raised annually for feeding cattle in the winter, and far more adequate to the idea of the Society for the Improvement of Arts, &c. with respect to the *winter cabatum* for cattle ; which they so assiduously and earnestly sought after.

As to the merit of the turnep-rooted cabbage for the table, the roots are eaten, and admired in the Northern countries. But, perhaps, in ours, where we have greater varieties of vegetables in gardens, and are thence more delicate, it may be thought inferior to the common turneps. But, to make amends, the herbage in the winter and spring is excellent. Mr. Reynolds says, in one of his letters, “ As an esculent plant, I “ can affirm its stalks and leaves to be little inferior to “ broccoli ; and may be cut much oftener : and therefore worthy the gardener’s notice : the more, as being impenetrable by frost.”

It may, perhaps, be thought some diminution of the value of this plant in husbandry, that it requires, according to Mr. Reynolds’s example in the culture of it, to be transplanted : which not only enhances the expence, but creates a dependance on favourable weather. His conduct in this point does not, however, establish the practice of transplanting to be necessary. As it was not the effect of experience, but, in a great measure, of accident. He sowed the seed, believing it to be the common turnep-cabbage ; and when the plants were come up, and he discovered them not to be so, he proceeded to plant,

plant them out into the ground prepared for them, probably both because he still imagined them to partake mostly of the nature of cabbages; and because he must have lost a great part if he thinned them by hoeing; as the whole was raised on only sixteen perches of ground. But both the manner of growth of the plant, and experience in other places, shew, that they may be sown, as turneps, and hoed; or thinned by hand. And this may be practicable, as well when sown in drill, as in broad-cast. The plants may certainly be allowed to be nearer each other also, than Mr. Reynolds placed them. The intervals, indeed, when sown in drills, cannot be less than two feet, where horse-hoeing is proposed: but the plants may be closer in the rows than two feet; and the crop, therefore, increased in proportion one-fourth, or perhaps one-third. For this plant does not so far recede from the nature of the common turnep, as to require to stand single at a considerable distance from any other, without injury to the root; though perhaps the herbage, when drawn up by the nearer approach of the plants to each other, may be less strong and copious.

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